THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXVII. No. 681.] LONDON, MAY 30, 1876. [28TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—12,000 cubic feet of gas per ton of coal: 28-candle gas; coke 66·70 per cent.; volatile matters 33·30 per cent. Coke of good quality.

RAMSAY'S PATENT CONDENSED GARESFIELD COKE.

RAMSAY'S ORDINARY GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.

GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES, CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.

Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne.

Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.
London, at the Lombard Exchange, 39, LOMBARD ST., E.C.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).

These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.

They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.

The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.

STEVENS & CO.,
(SUCCESSORS TO SAMUEL CALLEY. ESTABLISHED 20 YEARS.)
21, GT. WINCHESTER ST., LONDON.
WORKS: BRIXHAM, TORBAY.

THOMAS PROUD,
MANUFACTURER OF
WOOD GRIDS
FOR
SCRUBBERS
AND
PURIFIERS.

BROOKFIELD IRON-WORKS,
103, ICKNIELD STREET EAST,
BIRMINGHAM.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and other OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."

J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.

COWEN'S GARESFIELD COALS.
Coal Office,
QUAY SIDE, NEWCASTLE-ON-TYNE.

JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL AND CO.,
THE WEDNESBURY TUBE-WORKS, WEDNESBURY;
AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
WAREHOUSES:
69, UPPER THAMES STREET;
COMMERCIAL STREET, SPITALFIELDS;
5, CHARLES STREET, SOHO; and
16, SOHO SQUARE,
} LONDON
35, 36, 37, & 39, GRANBY ROW, MANCHESTER.

J. R. and Co. are the original manufacturers of Wrought-Iron Gas Tubes and Fittings, and Inventors of the LAP-WELDED TUBES for Locomotive and Marine Boilers.

J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.

Lists may be obtained on application to
69, UPPER THAMES STREET, LONDON.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
MANUFACTURERS OF
WET AND DRY GAS-METERS,
OF
FIRST-CLASS MATERIALS & WORKMANSHIP;
ALSO, STATION-METERS, PRESSURE-GAUGES, STREET-LAMPS, REGULATORS, &c.

ESTABLISHED 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM.
MANUFACTURERS OF
TELESCOPIC & SINGLE GASHOLDERS,
CAST & WROUGHT IRON TANKS FOR DITTO,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.

SUGAR, SALTPETRE, AND ALL KINDS OF PANS.
Roofs, Girders, and Bridges, and General Smith's Work.
LONDON AGENT—W. G. DAVIS, 2, Brabant Court, Philpot Lane, E.C.

J. & H. ROBUS,
CONTRACTORS
FOR THE
ERECTION OF NEW & REMODELLING OF EXISTING GAS-WORKS.

RETORT-SETTING A SPÉCIALITÉ.

RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL OR ELSE NO MONEY TAKEN FOR THE CONTRACT.

PLANS ON APPLICATION.
Retort-Setters sent to all parts of Europe and America
Address, J. and H. ROBUS,
BELL GREEN, CATFORD, LONDON, S.E.

THE
NITSHILL COMPANY'S
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.

AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.

GEORGE GLOVER & CO.

PATENTEES OF THE

NATIONAL STANDARD GASOMETERS

FOR THE ENGLISH GOVERNMENT
AND FOR THE GOVERNMENT OF THE NETHERLANDS
AND OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government,
AND MANUFACTURERS OF

IMPROVED DRY GAS-METERS

Warranted to Measure correctly & not to vary.

RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.
236, GEORGE STREET, GLASGOW, & 30, LANCASTER AVENUE, MANCHESTER.

FOREIGN AGENTS.
DAHL BROTHERS, COPENHAGEN. | W. HOVEN & SON, ROTTERDAM.
A. FAAS & Co., FRANKFORT O/M. | COPLAND & McLAREN, MONTREAL.
A. DEMPSTER, POST OFFICE PLACE, MELBOURNE.

SILVER MEDAL, PARIS EXHIBITION, 1867.

LLOYD AND LLOYD,

ALBION TUBE-WORKS, BIRMINGHAM,

MANUFACTURERS OF

WROUGHT-IRON TUBES AND FITTINGS

AND

LAP-WELDED IRON AND HOMOGENEOUS METAL BOILER TUBES.

Boiler-Tube Ferrules, Gun-Metal Gland Cocks, Water-Gauges, Whistles, &c.; Stocks, Taps, and Dies for Screwing, and Gas-Fitters Tools.

London Offices: No. 4, Cloak Lane, Queen Street, E.C.

WAREHOUSES:

LONDON: 157, UPPER THAMES STREET, E.C.

LIVERPOOL: No. 63, Paradise Street.
MANCHESTER: No. 7, Blackfriars Street, Salford.
PARIS: No. 38, Rue du Chateau d'Eau.
LILLE: No. 38, Rue Grande Chaussee.

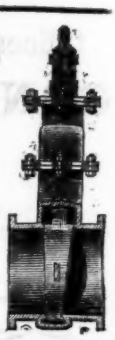
JOSEPH AIRD,

WELLINGTON TUBE-WORKS, TIPTON, STAFFORDSHIRE.

MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

C. & W. WALKERS' DOUBLE-FACED GAS-VALVES.



These solidly constructed double-faced Gas-Valves have taken the place of the old system of the light, single-faced disc, which is too uncertain and unreliable in large bores.

They are guaranteed absolutely gas-tight. They are very massive and rigid, and by improved modes of manufacture they are produced at very little excess in cost over the old light, weak system, which is liable to spring and bend, and become leaky.

The Valve is a rigid wedge of solid cast iron, having two perfectly scraped surfaced facings fitting between the two on the body, which are also surfaced.

A spring in two short halves, and, therefore, not liable to break, is used only for scraping the front facing clean.

The front facing is vertical; the back facing forms the wedge.

At a slight additional expense both flanges are faced to bolt to main-pipes.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

THE LANCASHIRE GAS-METER COMPANY,

LIMITED,

FALCON METER-WORKS, OLDHAM,

MANUFACTURERS OF

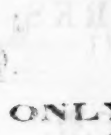
WET & DRY GAS-METERS, GOVERNORS, PRESSURE & EXHAUST REGISTERS,

&c., &c.

STREET-LAMP METERS in CAST-IRON CASES.

LAMP COCKS AND BRASS FINISHING IN ALL ITS BRANCHES.

TRADE MARK



THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;
LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;
HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;
GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

London Agent: W. G. DAVIS, 2, BRABANT COURT, PHILPOT LANE, E.C.

GAS PURIFICATION & CHEMICAL Co., LIMITED.

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

1862.

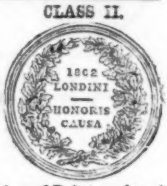
PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

CLASS II.



This Paint having been in general use over fourteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced for resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

The following Gas Companies in London have used the Paint for years—viz., The Gaslight and Coke, Imperial, Independent, City of London, Commercial, London, and Surrey Consumers.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

Established

1795.

JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

THE

IMPERIAL METER COMPANY,

LIMITED,

KING'S ROAD, LONDON, N.W.,

OFFICE: 115, VICTORIA STREET, WESTMINSTER, S.W.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS IN IRON & TIN-PLATE CASES,

STATION-METERS AND GOVERNORS, STREET-LAMP METERS, BOXES, AND REGULATORS FOR THE AVERAGE METER SYSTEM.

TO GAS COMPANIES, ENGINEERS, &c.

These Works are in full operation, and it will be the aim of the New Company not only to keep up the excellent workmanship of their predecessors, but, by the introduction of special machinery, to manufacture Meters of a higher standard than is usually given, without increasing the cost.

Special attention is invited to the Compensating Wet Gas-Meter of De Castro and Burton, which is now becoming so generally adopted, and is more simple in construction than any other Compensating or Ordinary Wet Meter. There is but one centre of friction to be overcome by the gas. By its self-adjusting principle it maintains an unvarying water-line; and the reservoir contains sufficient water to supply the Meter for twelve months without attention. It is unaffected by "tilting," and cannot be "flooded" by any pressure.

The Company also manufacture Dry Meters upon the most improved principle, and all their Meters being made to standard gauges, the most accurate measurement is obtained.

Attention is also called to their Dry Meters in Wood Cases, as used by some of the London Gas Companies. These Cases are a great preservation to Tin-plate Meters, especially in seaport towns, where the air is impregnated with salt; they are also particularly suited for export.

The Company repair or convert every description of Wet Gas-Meters to De Castro and Burton's Patent.

HODGE & CO.'S

IMPROVED VENTILATING SUN-LIGHTS

WITH TALC REFLECTORS AND SELF-ACTING VALVES TO PREVENT DOWN-DRAUGHT;

VENTILATING GLOBE LIGHTS for DINING-ROOMS, LIBRARIES, &c.

Ormolu, Bronze, & Crystal Gaseliers;

MEDIÆVAL CHURCH WORK AND CORONÆ

COCKS, VALVES, and FITTINGS for GAS, STEAM, and WATER;

COLUMNS, BRACKETS, & STREET LANTERNS;

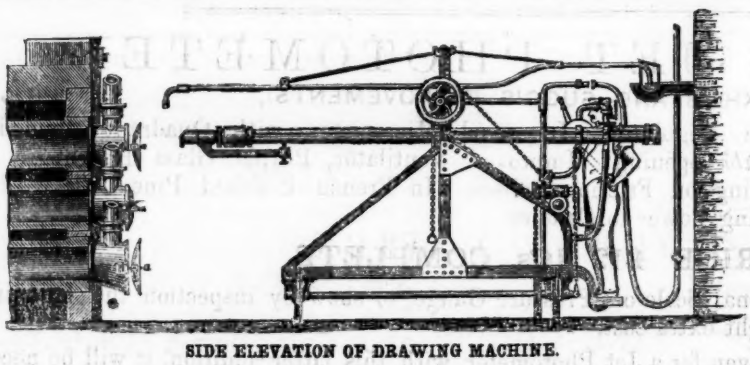
BLACK AND GALVANIZED BARREL COMPO AND TIN PIPE.

GAS ENGINEERS,

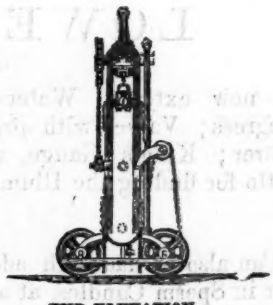
100, HATTON GARDEN, LONDON.

Drawings and Prices upon application.

FOULIS'S PATENT STOKING MACHINE.



SIDE ELEVATION OF DRAWING MACHINE.



END ELEVATION.

(The Charging Machine will be Illustrated in next week's Advertisement.)

Makers: TANGYE BROTHERS and HOLMAN, London and Birmingham; ADAM WOODWARD and SON, Manchester; ROBERT LAIDLAW and SON, Glasgow; MASCHINENBAU-ACTIEN-GESELLSCHAFT HUMBOLDT, Kalk bei Deutz;

Or all particulars may be had from JAMES WOTHERSPOON, 31, St. Vincent Place, Glasgow.

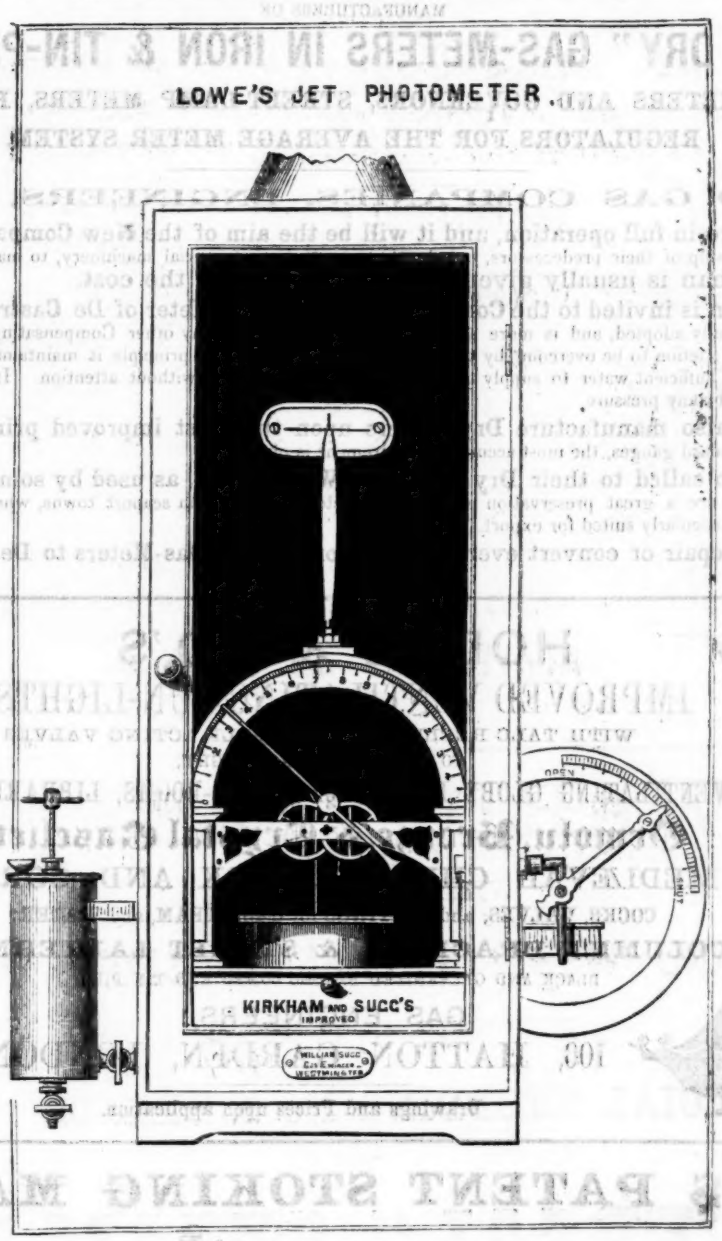
WILLIAM SUGG,

GAS ENGINEER,

VINCENT WORKS, VINCENT STREET,

WESTMINSTER, S.W.

"EVANS" Photometers, which do not require a Dark Room, with every Fitting accurately made to Gauge, French Polished Bench and Drawers complete, as approved by the Gas Referees.



"LETHEBY" Photometers, with Fittings and Bench complete for Dark Room, as approved by the Gas Referees.

LOWE'S JET PHOTOMETER

(KIRKHAM AND SUGG'S IMPROVEMENTS),

With new external Water-Line Regulator; Improved Micrometer, with Quadrant divided into 45 degrees; Valve, with *pro ratâ* opening; Improved Ventilator, Purple Glass Height of Flame Measurer; King's Gauge, working on Friction Rollers. In French Polished Pine Case. Diagram for ditto for finding the Illuminating Power in Candles.

PRICE £12 10s. COMPLETE.

Can also be had with additional Scale on Pressure Gauge, to show by inspection the Illuminating Power in Sperm Candles, at a slight extra cost.

NOTE.—When an order is given for a Jet Photometer with this latter addition, it will be necessary to state about the quality of Gas for which it will be used. The range in candles will not be more than three or four.

PRICE LISTS WILL BE FORWARDED POST FREE ON APPLICATION.

JOHN WRIGHT AND CO., ESSEX WORKS, BIRMINGHAM,

Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

Crystal Palace District Gas Company, Lower Sydenham, S.E.

To Messrs. John Wright and Co., Essex Works, Birmingham.

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.

Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.

No. 4003.

THE CHEERFUL GAS STOVE, with Copper Reflector.

Has all the appearance of a Bright Fire.

PRICE from 32s.

HAYWARD TYLER & CO.,

WILL EXHIBIT AT THE

BATH AND WEST OF ENGLAND SHOW, HEREFORD,

JUNE 5, 6, 7, 8, & 9,

SPECIAL SHEDDING No. 2, STANDS 31, 32,

THEIR

"UNIVERSAL" STEAM-PUMPS

AND OTHER MACHINERY.

GREAT REDUCTION IN PRICES,

Owing to increased Facilities for Manufacture.

ENGINEERS,

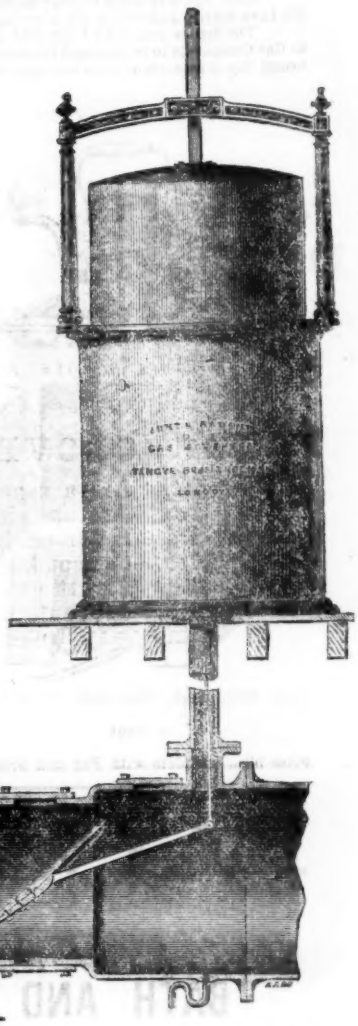
84 & 85, WHITECROSS STREET, LONDON.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

SOLE MAKERS OF

HUNT'S PATENT EQUILIBRIUM GAS GOVERNOR.



In this Governor a Throttle-Valve is substituted for the ordinary suspended Cone, all external communications being avoided by placing the Lever or Radius Arm (shown at C on the drawing) inside the Valve-Chamber upon the Disc. The Disc is carried upon steel centres, upon which it is accurately balanced and turns freely. The friction in working is thereby reduced to a minimum. This Governor is extremely sensitive to alterations of inlet or outlet pressure, and renders a large actuating holder unnecessary.

The principal advantages of this arrangement over the ordinary form of Governor are as follows:—

Its sensitive action prevents oscillation.

It is self-adjusting—*i.e.*, it maintains a steady pressure under variations of inlet pressure or a fluctuating consumption.

The inlet to Gasholder being contracted to the smallest possible dimensions, all danger from leakage through insufficiency of seal, tilting, &c., is entirely avoided.

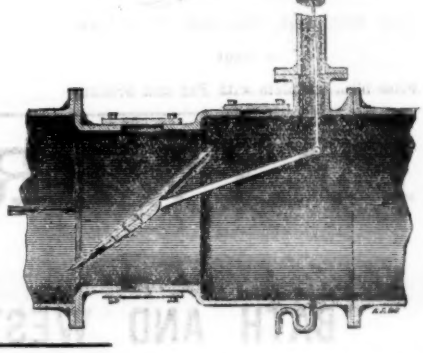
The valve portion being separate from the holder, it can be handled and fixed like an ordinary Slide-Valve direct in the main; and the holder can be placed at any convenient distance immediately above it. The cost is thus materially reduced, and the inconvenience of heavy lifts done away with.

There are no working parts likely to get out of order.

These Governors have been adopted by several leading Gas Companies, among whom are the following:—

The Gaslight Co.—two 36 in. at Blackfriars.
" " a 36 in. at Goswell Road.
" " a 24 in. at "
" " a 24 in. at Whitechapel.
" " an 18 in. at Bow Common.
" " a 24 in. at Beckton.
" " a 6 in. at "
The London Gas Co.—a 24 in. at Nine Elms.
" " an 18 in. at "
" " an 8 in. at "

The Exeter Gas-Works—a 24 in.
" Abergavenny Gas-Works—a 10 in.
" Birmingham Gaslight Co.—an 8 in.
" Monmouth Gas-Works—an 8 in.
" Devonport Gas-Works—an 8 in.
" Cannes Gas-Works—an 8 in.
" Mentone Gas-Works—an 8 in.
" Rochdale Gas-Works—a 4 in.
" Imperial Gas Co., a 12 in at Great Cambridge Street.



TESTIMONIAL.

The Gaslight and Coke Company, 9, Water Street, New Bridge Street, Blackfriars, E.C., Feb. 27, 1875.

MESSRS. TANGYE BROTHERS AND HOLMAN.

Gentlemen,—The two 24-inch and three 36-inch Hunt's Equilibrium Governors supplied by you, and fixed in the valve-rooms at Whitechapel, Goswell Road, and Blackfriars, are working very satisfactorily.

Yours truly,

(Signed) JOHN JOHNSON.

VIENNA EXHIBITION, 1873.—The highest prize and only Medal "for Progress" for Direct-Acting Steam Pumps for general purposes was awarded to TANGYE BROTHERS AND HOLMAN, Engineers, London, for

THE "SPECIAL" DIRECT-ACTING STEAM PUMPS.

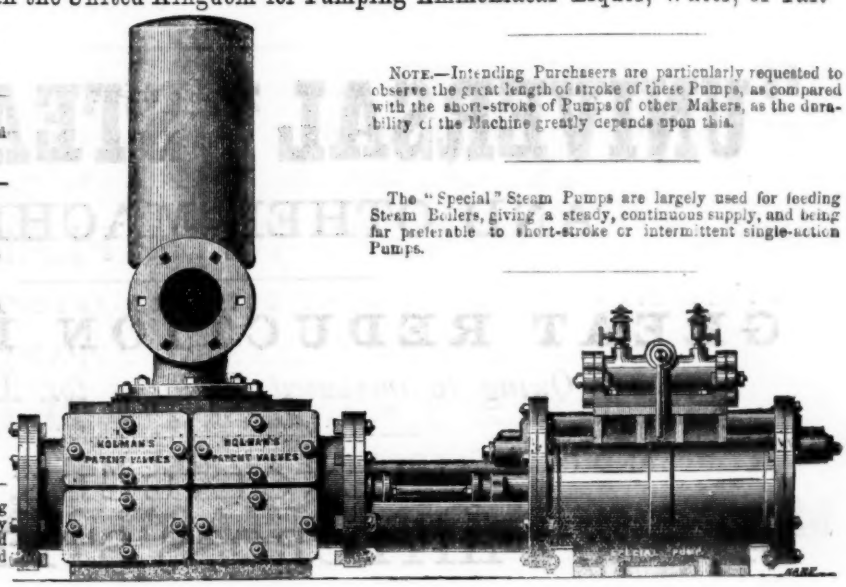
Upwards of 12,000 have been sold in England and America.

In use in a Hundred Gas-Works in the United Kingdom for Pumping Ammoniacal Liquor, Water, or Tar.

The following are a few of the leading Sizes:—

Diameter of Steam Cylinder.	Diameter of Water Cylinder.	Length of Stroke.	Gallons of Water per Hour, Approximate.	Reduced Prices.
3	1½	9	450	£16
4*	2	9	815	18
3	3	9	1,830	18
5*	3	12	1,830	22 10
4	4	12	3,250	25
6*	4	12	3,250	30
5	5	12	5,070	32 10
7*	5	12	5,070	40
6	6	12	7,330	40
8*	6	12	7,330	50
7	7	12	9,750	50
10*	7	12	9,750	65
8	8	18	13,000	65
10	9	18	16,500	80
10	10	24	20,000	100
12	12	24	30,000	140

* These sizes being usually selected for pumping Tar and Liquor, are always in stock or nearly ready, fitted with all pump details in iron, and extra length distance piece between steam and pump cylinder at a small extra cost.



NOTE.—Intending Purchasers are particularly requested to observe the great length of stroke of these Pumps, as compared with the short-stroke of Pumps of other Makers, as the durability of the Machine greatly depends upon this.

The "Special" Steam Pumps are largely used for feeding Steam Boilers, giving a steady, continuous supply, and being far preferable to short-stroke or intermittent single-action Pumps.

London 1851. New York, 1853 Paris, 1855. London, 1862.

Dublin, 1865 The SIX MEDALS AWARDED to THOMAS GLOVER for Paris, 1867.

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

CONTENTS.

	PAGE
Circular to Gas Companies:—	
Metropolitan Gas Legislation	805
Progress of the Chartered Company's Bill	805
South Metropolitan Gas Company's Bill in Committee	805
Increase in the Salary of the Secretary of the Chartered Company	806
Mr. Field's Analysis of Gas Companies Accounts	806
The "Woolwich Monster" and the Beckton Gasholders	806
Water and Sanitary Notes:—	
Source of Water in the New Red Sandstone	806
The Corporation of Halifax and their Water Undertaking	806
The Richmond Vestry and their Sewage Scheme	806
Leading Articles:—	
Compulsory Purchase of Statutory Water-Works Undertakings	807
A New Tool	807
Correspondence:—	
Retort-Settings	807
Referees and Patentees	807
Slough Sewage Scheme	807
Parliamentary Intelligence:—	
Progress of Bills in House of Lords	808
Progress of Bills in House of Commons	808
Mr. Patterson's Patent for Sulphur Purification	808
House of Commons Committees—	
The Gaslight and Coke Company's Bill	808
South Metropolitan Gaslight and Coke Company's Bill	812
Stockton and Middlesbrough Water Bills	819
Legal Intelligence:—	
High Court of Justice—Queen's Bench Division—Sugg *v.* Silber	821
Miscellaneous News:—	
Weston-super-Mare Water-Works Company	807
Normanton Sewerage	824
Beccles Water and Gas Company	824
Metropolis Gas Supply	825
Metropolis Water Supply	825
The Average Meter System for Public Lamps in London	825
Meeting of the Georgetown (British Guiana) Gas Company	826
Meeting of the Bombay Gas Company	827
Meeting of the Mauritius Gas Company	828
Leeds Corporation Gas-Works	829
On the Construction of Gasholders	829
Mineral Compensation Case	830
Trade Reports	831
Cambridge University and Town Water Company	832
Staffordshire Potteries Water Company	832

NOTICE TO SUBSCRIBERS.

In consequence of the Whitsun Holidays, the next Number of the JOURNAL OF GAS LIGHTING *will not be published until Wednesday, June 7.*

TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 30, 1876.

Circular to Gas Companies.

It can hardly be said, that the state of metropolitan gas affairs is less peculiar and complicated than when we wrote last week. The Chartered Company's Bill has passed the House of Commons, and will go before Lord Redesdale unopposed, except as regards the small strip of land belonging to the Metropolitan Board of Works. We shall not pretend to sketch the shifting expressions of his lordship's face, nor the action of his shoulders, as he goes through the clauses of this extraordinary measure. The noble lord has devoted some years, and much anxious thought, to building up a system of legislation for gas and water companies, which, no doubt, he believed would satisfy at once the claims of the companies and the interests of consumers; and he has not been altogether wrong. Gas companies have loyally accepted a seven per cent. maximum dividend for new ordinary share capital, with a strict limitation of the interest to be paid on loan capital, raised in a settled proportion. On the lines laid down by Lord Redesdale, all provincial gas companies have been legislated for during many years. For some reason or other, however, as Sir Edmund Beckett remarked, when opening the case of the South Metropolitan Company, Parliament has seen fit to deal with the metropolitan gas companies in an exceptional manner; and we may add that the consequence has been an incessant agitation on the gas question. We who have, at times, complained of Lord Redesdale's rigid principles, and the severe restriction to seven per cent., may now admit that their application has brought peace to most country companies; and we may also express a regret that they have not been applied more generally to the London companies.

The preamble of the South Metropolitan Company's Bill has been passed by the Commons Committee; but we need hardly say, that it is a Bill in some respects very different from that originally promoted by the company. That Bill, as our readers know, followed exactly the lines of the Regulations Bill, as settled by Mr. Forster's Committee, and of the Commercial Company's Bill, as accepted and passed by Parliament. Never, to all appearance, had a measure a better chance of success. The principle, and, we may say, details of it, had been approved by a committee of the House of Commons, after a sitting of nineteen days, and had subsequently been confirmed by both Houses of Parliament, when they passed the Commercial Company's Act. Nevertheless, this Bill has undergone such alterations in committee this year, that it cannot be to the interest of the company to proceed with it further. We will refer, first, to the insertion of auction clauses, which the company did not desire, but could not resist when the Chartered Company had accepted them. It is nothing to the purpose; but it may be mentioned here, *à propos* to what will follow, that the original Chartered Company have £700,000 of worn-out capital—that is, capital which earns nothing, but on which, nevertheless, ten per cent. is paid. The South Metropolitan Company, on the contrary, have expended £80,000, which is now productive, but on which they ask for no dividend at all. Surely, if any company were ever entitled to some exceptional consideration, this company were. The shareholders have foregone the £80,000, which, however, they had a just reason to believe they might recover by premiums on newly issued shares. They have been disappointed, and we sincerely condole with them.

Then as regards initial price. The decision of Mr. Forster's committee was clear, precise, and emphatic. They fixed an uniform initial price for the whole of the companies, and we shall not say that the decision was unjust. It had the appearance, as we pointed out, of pressing hard on consumers in one district in the South of London, and it will be remembered that we commented upon it when Mr. Forster's decision was made. But their own point of view was perfectly different from that occupied by the vestries who have recently defeated the South Metropolitan Company. We have all along contended for such a modification of the Act of 1860 as would give the companies their full statutory dividends, and ensure to consumers the profits in excess of such dividends. The sliding scale, we conceived, must be unjust to either company or consumer. On the former, it would—we may now say *will*—inflict a penalty, if prime materials be dear; and, as regards consumers, the operation of the sliding scale will certainly prevent them from having the *full* benefit of any reduction in the cost of materials. How far they might participate will depend on the policy pursued by the individual companies, which we shall not pretent to indicate. We merely say that the first care of a company must be the protection of their shareholders. Recent proceedings have clearly shown that consumers, as represented by local authorities, have no consideration for shareholders.

This part of the question, however, need not be further discussed. The South Metropolitan Company originated the sliding scale, and they are quite prepared to abide by all its results, but they wish for a fair start, which they will not have if the Bill passed by the committee of the Commons is accepted by the House.

We say but little here of the base ingratitude of the local authorities who have opposed the company. No gas manager, who knew the world, has ever made it his study to please consumers. One, whom we must consider innocent, has done so, and now we behold the result. He ran great risks in making short contracts for coal, he starved the "wear and tear" account of the company, all to keep down the price of gas to the consumer; and what is his reward? The local authorities insist that the price of gas shall be kept down, and that the company shall derive no benefit from their self-sacrifice. Gas companies will well understand the situation; and, for the future, we dare say no single one, metropolitan or provincial, will ever again study the interests of consumers, unless coincident with their own. The decision of Mr. Walter's committee has dealt a blow, the effects of which will be felt far beyond the limits of the metropolitan area; and gas companies all over the United Kingdom will now understand that any sacrifice they may make will only be regarded as a lever, by the force of which to raise and extort still further concessions.

But a Nemesis approaches. The Board of Trade, it is now decided, will intervene between the combatants. The Metropolitan Board of Works remain stripped, ready to continue the encounter; but if a more powerful party enter the arena, they are willing to submit to any terms he may dictate. They will not withdraw their Bill (*vide* report of Parliamentary Committee, published in another column); they will wait to see what the Board of Trade proposes; and, whatever these propositions may be, we know that the Metropolitan Board will incontinently retreat from the unintrenched position they have taken up. We also wait to see, with some curiosity, what the propositions of the Board of Trade will be. But of this we feel certain—viz., that they will involve uniformity in every respect—uniformity in the quality of the gas, uniformity as regards the application of sliding

scale and the mode of raising new capital, and, what is of more importance to our argument just now, uniformity in initial price. The Vestries of Camberwell and Lambeth may protest as much as they please. They have had their fling, and have spent their £300 apiece, and presently they will have to submit to all they have protested against. We do not pity them.

It will be seen, from the report mentioned above, that the struggle for the power of dictation in Metropolitan gas affairs is now between the Board of Trade and the Metropolitan Board of Works. The intentions and views of the latter we know. As regards the wishes of the former, we know but little. We know their sources of inspiration, and are aware that they favour amalgamation. We have also reason to believe that they favour uniformity of legislation in every respect. Thus we may consider that the South Metropolitan Company is, after all, safe in the future. Whatever the proclivities of the Board of Trade may be when they favour amalgamation, it is clearly to no single company's interest that one should be bound down to a lower initial price than another. If the South Metropolitan should get power to amalgamate, tied down to an initial price of 3s. 6d., it is certain that no company, north or south of the river, will amalgamate with them. But the company cannot, and will not, remain isolated. If they be deprived of the power of amalgamation on reasonable terms, the South London Companies fall inevitably into the hands of the Chartered Company. We say nothing as to the results of this; we simply tell the Vestries of Camberwell and Lambeth, that that is the point they have brought matters to, after spending their £300 apiece.

There are one or two other matters brought forward, in the discussion of the clauses of the South Metropolitan Company's Bill, to which we must make a brief allusion. The company asked for power to raise part of their contemplated new capital by way of preference shares; but it was argued, on the part of the Metropolitan Board of Works, that preference capital would stand in the way of the operation of the sliding scale. It might; but it is "an owl's eye," as Mr. Carlyle would say, that cannot see that preference capital is an advantage to consumers.

Then, if our ears did not deceive us—for, as we write, we have no report of the proceedings—Mr. O'Hara, on the part of the Metropolitan Board, wished to have the interest on borrowed money limited to three per cent. Could there be anything more absurd than such a proposal? The Metropolitan Board, with all the rates they command, cannot borrow for less than three-and-a-quarter, and they wish to compel the gas companies, with a risky business, to borrow money at a less rate of interest. Perhaps our ears deceived us. At all events, if they desire to insist on this point, the Chartered Company's Bill must undergo revision.

The testing clauses next came under review, and a glaring inconsistency was revealed. The penalty for an excess of "sulphur," it is proposed to make £50 for any station. But the make of gas at Beckton is seven times that at the South Metropolitan works, and it would be the height of injustice to make the penalty equal in the two cases. Clearly, much should be left to the discretion of a magistrate, and the words "not exceeding "£50" must be inserted in the Act of the future. The Board of Trade will see to this point.

We may pass over the discussion as to the cost of the additional illuminating power of two candles, which the South Metropolitan Company consented to supply, and the enhanced cost of the gas which entitled the company to an advanced price. It is impossible to get a clear conception of this matter into the head of a vestryman, who cannot distinguish twelve from twenty-candle gas, and declares that neither gives any light. The consequences, however, of such a compulsory increase of illuminating power to the South Metropolitan Company are of the utmost importance. Two candles additional means, whatever Mr. Livesey may say to the contrary, fourpence per 1000 feet more in cost, and the large penalties the company might be subjected to for default must compel them to incur the increased expense. We drop the subject here to-day, and wait with anxiety the proposals of the Board of Trade.

Referring to the proceedings at the special meeting of the Chartered Company, reported in our last number, we heartily congratulate the talented secretary on the substantial addition made to his salary. Everybody knows that all the combinations already entered into are mainly the results of his work, and it will be easily understood that further exertions will be required from him, in bringing about amalgamations which may now be deemed inevitable. The unwise opposition of some local authorities to the Bill of the South Metropolitan Company, may, perhaps, have the effect of throwing the Surrey Consumers and Phœnix Companies into the arms of the Chartered, and Mr. Phillips may find still more work on his hands. We have some suspicion that the decision of the committee was prompted by those whose desire it is to bring about complete amalgamation, and the hint may be taken in time. We shall not discuss this matter further to-day, but we say again, we congratulate Mr. Phillips. A salary of £3500 a year will well support the dignity of a knighthood, when the day comes for that coveted honour to be conferred.

Our indefatigable friend, Mr. Field, has already issued his "Analysis of the Metropolitan Gas Companies Accounts for "1875"—thus, by the courtesy of the companies, anticipating the publication of the accounts presented to Parliament, to which alone we have access. The completeness of Mr. Field's analysis makes it of the greatest value to all gas companies, and Sir C. Dilke, who is so anxious to see the accounts, had better purchase a copy at once.

Mr. Field has also published books containing forms of accounts, which, when properly filled up, will show, at a glance, the whole state of affairs in a gas company. There are books, of which it is said that no library should be without them. We say emphatically, that no gas company should be without Mr. Field's book; and every manager, and every director, will find it to his interest that each column lined out in these books should be accurately filled up. That being done, the exact position of the undertaking will, as we have said before, be seen at a glance. It is hardly necessary to say more; but we may add, that the headings of the columns embrace every possible source of expenditure and revenue, to be worked out in the usual way, showing the ultimate result of the operations of the company. We may also commend the books to the notice of some Corporations; for, by their use, mystifications may be avoided.

When the large gasholders were erected at Beckton, it was suggested that they might prove dangerous to the safety of the Royal Arsenal at Woolwich. It turns out, however, that the proximity of Woolwich is rather more dangerous to the Beckton works. The fact is reported, that whenever the eighty-one-ton gun is fired, the effect on the atmosphere is such, that the plates of the gasholders (about a mile distant, we rather think) are driven in about half an inch in opposition to the pressure within the holder, which is about seven inches of water. If this be true, it is certain that the riveting will soon be seriously disturbed, and the gas company will earnestly desire the speedy removal of the "Woolwich Monster" to Shoeburyness. The discharge of the gun took the breath out of us, when standing within a hundred yards of the muzzle; but we were not prepared to hear of such serious effects at the distance of a mile.

Water and Sanitary Notes.

An interesting, but somewhat disappointing, lecture has been delivered at Liverpool, by Mr. Boult, "On the Source of the "Water in the New Red Sandstone." We are inclined to dissent from many of the views held by the lecturer, but, accepting his statements as to the pollution of the water of the wells, which would seem to be irremediable, we may ask, Is not this an additional reason for the adoption of a source of supply, certain to be constant, and beyond the suspicion of serious contamination? It seems to be clear that the more the wells are pumped, the greater will be the liability to surface pollution, and if pushed to the last extremity, a great accession of water from the Mersey must be expected. Some water from this source already gains admission to the wells, and more must be expected if the balance of pressure be destroyed. On the whole, the lecture of Mr. Boult must be taken to encourage the Water Committee of the Council.

The Corporation of Halifax have not altogether succeeded with the Bill they have had before a committee of the House of Commons. Years ago they obtained power to appropriate a watershed, which belonged as much to other districts as their own, and consequently were bound down to supply some places, in bulk, at the low rate of sixpence per 1000 gallons. The outlying Local Boards have thus been able to furnish water at a profit, while the Corporation of Halifax have lost by every gallon they have sold in bulk. The attempt to get rid of the bad bargains made has failed. Halifax is fast bound for the next ten years, which means, as the local print says, ten years more of grinding taxation. It is undoubtedly a very hard case for the ratepayers of Halifax, but relief will come in time. Surely, however, it must be possible for the Corporation to make some equitable arrangement with the outlying local authorities. There would probably be no difficulty if individuals were concerned; but Local Boards, we fear, have no consciences. We are very sorry for the ratepayers of Halifax, and sincerely hope that, in the future, they may be better served by their Corporation.

The Richmond Vestry are making, as we think, praiseworthy efforts towards a complete scheme of drainage for all the places which go to form the Richmond Poor-Law Union, and which includes Mortlake, Ham, Petersham, and Kew. These places are so situated that they may well combine in one system for the disposal of their sewage. We are not yet, however, acquainted with the

mode of disposal recommended for adoption, if, indeed, one be determined on. The choice of the vestry lies between chemical treatment or intermittent filtration, for an irrigation farm is out of the question in the locality. We shall presently hear more of the scheme. The Thames Conservancy have sent them their *ultimatum*. The Vestry of Richmond have been talking for ten years, and have practically done nothing. Now they must act. The step they have taken towards the formation of an united district for drainage is, as we have said, a very laudable one; but we hope it is not a "dodge" to get more time. There has been enough of talk. The Conservancy Board must now insist that something shall be done.

COMPULSORY PURCHASE OF STATUTORY WATER-WORKS UNDERTAKINGS.

The directors of the Stockton and Middlesbrough Water-Works Company have issued an address, in which they call the attention of directors of water and gas works companies generally to the fact that a bill has passed the House of Commons, and been introduced into the House of Lords, containing provisions for the compulsory purchase by the corporations of the two boroughs of their undertaking, which was established a quarter of a century ago under the authority of Parliament. This object is to be attained by the uncertain and expensive means of a compulsory arbitration.

The principle of compulsory purchase has never yet received the sanction of Parliament, and the directors of the Stockton and Middlesbrough Water-Works Company have offered unsuccessfully before the Commons Committee their most strenuous opposition to the above-named bill, in which that principle is affirmed.

Believing the affirmation of such a principle to be not only impolitic but unjust, and, moreover, calculated to seriously affect the value of all similar undertakings throughout the country, the directors have unanimously resolved to continue in the House of Lords their most strenuous opposition to the bill in question.

Although the time for petitioning is short, it is hoped that other boards of directors will see their way to promptly petition the House of Lords to reject the bill, and thus strengthen the opposition about to be offered before the Committee of their Lordships House.

A form of petition has been prepared, which, after reciting the facts, proceeds to allege—

That in the opinion of your petitioners such an object is inimical to the interests generally of the proprietors of works for the supply of water (for which service this country has hitherto been largely and indeed mainly indebted to private enterprise); and inimical to that watchful protection of interests created by Parliament which Parliament has hitherto observed. Its sanction would therefore be regarded by your petitioners as a peculiar hardship; and they therefore trust that so great an injustice as that sought to be authorized by the bill will not be sanctioned.

Your petitioners respectfully submit that it is contrary to the policy of Parliament to grant any local authority power to supply water even for their own consumption where there is an existing company in the district capable and willing to afford a supply, and they also submit that in no case has Parliament ever conferred compulsory powers of purchase of a company's works, and they trust that so great an injustice as that sought to be authorized by the bill will not be sanctioned, and that the bill will not be allowed to pass into a law.

A NEW TOOL.

Is it new? When so many persons profess to know everything, and some a little more than that, caution is necessary in saying what is new.

Here is the description of a tool I have had made,* and which appears to me likely to be useful. A saw: the blade of steel (No. 12 B. W. G.) 14 inches long, 6 inches wide at the hilt, and tapering to 4 inches at the rounded point. It is fixed in a very strong ordinary loop handle. Teeth—one-fourth of an inch deep—are cut on each edge of the blade, and set so as to pass No. 10 gauge. What is the use of the saw? Not to cut, but to scratch. To clear, as it will quickly and effectively, the incrusted nodules of lime from between the bars of the grids of purifiers.

J. O. N. R.

Black Rock, Brighton, May 26, 1876.

Correspondence.

RETORT-SETTINGS.

SIR,—I notice the design for retort-settings by "W. M. A.," in your issue of the 16th inst., which is very good, though not new, except that the breadth of oven is not very great. It would be interesting to have a section of the setting, or, if "W. M. A." would kindly say what size and shape his retorts are, also give the size of space or flue between bottom retorts and side of oven.

As "W. M. A." shows a 15-inch fire, I infer it is intended to burn "cinders;" if so, the bottom retorts, being over the fire, will require shielding, as tar is generally burnt to assist such firing.

I cannot see how the elevation can be "the same as Mr. Hall's," and I shall be glad if "W. M. A." will explain, or give a section.

May 23, 1876. T. D. H.

REFEREES AND PATENTEES.

SIR,—While I agree in your expression of sympathy for Mr. Patterson, who has done good service in proclaiming the true theory of lime purification, and has just suffered a heavy loss, I have always taken the view expressed by Lord Justice James as to the questionable propriety of a member of an official commission taking out a patent for the subject-matter of their official investigations.

It appears, from the reports in your JOURNAL, that the fact of my having taken out a patent has been referred to on more than one occasion, in connexion with the patent taken out by Mr. Patterson, as if the two cases were similar.

This suggestion is unfair both to myself and to the Board of Trade, by whom I have been reappointed from year to year.

I beg leave, therefore, to state: 1. That the process I have patented had already been invented, and a provisional specification had been lodged, before I was appointed a Gas Referee. 2. That the process does not aim at reducing the amount of sulphur in gas, but is a mode of treating oxide with a view to extracting sulphur and ammonia from it. 3. That at the time of my first appointment as Gas Referee the Board of Trade were informed of the patent I was taking out, and received my explanation and assurance that it did not touch those matters with which I should be called upon to deal officially.

I may add that, as the institution of a sulphur maximum has caused the almost entire substitution of oxide by lime, my process cannot be adopted by those companies with which I am officially connected.

A. VERNON HARCOURT.

Christchurch, Oxford, May 25, 1876.

[Probably some misunderstanding has arisen from the fact that Mr. Harcourt applied for letters patent in November, 1870 (No. 2974), for an invention of "Improvements in the Purification of Gas." The object, as stated in his provisional specification, being the "complete removal from gas of impurities existing as sulphur compounds." (See J. G. L., Nov. 21, 1871.)—ED. J. G. L.]

SLOUGH SEWAGE SCHEME.

SIR,—In your JOURNAL, on the 25th of last April, you had a paragraph, on p. 607, upon "A Scheme for the Disposal of Slough Sewage," as "involving the institution of a sewage farm within half a mile of Windsor Castle," and you proceeded to state that, "the Commissioners of Woods and Forests determined to oppose the scheme on the part of the Crown, and it has consequently been abandoned."

Your comment upon this statement is as follows:—"Thus much, then, seems to be settled. A sewage farm cannot be laid out within half a mile of a Royal residence." The reasonable inference to be drawn from this remark is this, that the Commissioners of Woods and Forests opposed the scheme, because the farm would be too near Windsor Castle, the residence of the Queen.

The College of Eton are opposing the Slough Scheme (for the matter is hardly yet settled), because the farm, as proposed, would be within 400 yards of the Eton boys playing-fields, and their agents are in combination with the officers of the Crown in their opposition. From this circumstance, your present correspondent has the opportunity of knowing that the opposition on the part of the Crown to the Slough scheme arose entirely from the fact that the farm proposed would be too near to the Home Park, a public thoroughfare, and now for many years dedicated by the Crown to the inhabitants of Windsor as a place of public recreation. The private convenience of Royalty had nothing whatever to do with the opposition of the Crown to the Slough scheme.

A MEMBER OF THE GOVERNING BODY OF ETON SCHOOL.

May 27, 1876.

WESTON-SUPER-MARE WATER-WORKS COMPANY.—The annual meeting of the shareholders in this undertaking was held on the 20th inst.—Mr. Alfred Hill presiding. The directors report, after referring to a small extension of the mains made during the year, and stating the works were in so satisfactory a condition that it was to be hoped no extensive repairs would be needed for several years to come, gave a table, in which was shown the steady increase that had taken place from year to year in the company's revenue. It then announced that the increase on the year had been £138, and proceeded:—"The net earnings of the year, after deducting the mortgage interest and adding £100 to the depreciation-fund, had been £1644 14s. 4d. An interim dividend of 3½ per cent. having been paid in November, there remains but 4 per cent. payable to the proprietors to make up the maximum dividend of 7½ per cent. for the year 1875. To meet this would require £750, leaving a balance of £894 14s. 4d. It will be in the recollection of the proprietors that during the first ten years of its existence the depressed state of the company's affairs precluded the payment of any dividend whatever, and it was not till the year 1864 that the first dividend was paid. This first dividend did not exceed 2½ per cent. From that date, however, the dividend had steadily increased until the increased profits in 1874 enabled the company to reach its maximum dividend, 7½ per cent. While by the Act of Incorporation the dividend is limited to 7½ per cent. for any one year, a power is reserved to the company to make up to the proprietors out of surplus profits the deficiency of dividends in the years in which less than 7½ per cent. was paid. The revenue account for the past year shows, after providing for the payment of the maximum dividend, a considerable surplus, and the directors look forward with confidence to a larger surplus even being earned in this and in succeeding years. Although the deficiencies of dividends in the years prior to 1874 amount in gross to the sum of £12,954 8s. 3d., the directors see no reason to doubt that in course of time these deficiencies will ultimately be made good to the proprietors of the old shares." The report further referred to a letter which Mr. Osler, a very large shareholder, had sent out with reference to paying the back fees of the directors, and said the directors had received notice of his intention to propose a resolution at the meeting. The report having been received and adopted, Mr. A. F. Osler, of Birmingham, said as one of the original, and a not inconsiderable subscriber to the undertaking, he had come down for the purpose of asking his brother proprietors to do an act of justice to the directors. Those gentlemen had by their careful, judicious, and most economical management, brought the undertaking from a state closely bordering on insolvency to its present most satisfactory and hopeful condition. During the many years of depression the directors had declined to accept any remuneration for their services, and having had opportunities for seeing how assiduously they had worked in most anxious times, he considered that before they divided any back profits they ought, as a simple act of justice, to make good to those gentlemen the fees to which they had been entitled, but which, in order to ease the company, they had not received. Mr. Osler read a letter from Sir Rowland Hill, who had been prevented by advanced age and infirmity from undertaking the journey to Weston, but who expressed a very strong feeling in sympathy with Mr. Osler's views, and appealed to his brother shareholders not to withhold an act of justice. Mr. Osler moved a resolution to the effect that £650 of the surplus should be applied for the purpose he had named, of paying the back fees to the directors and auditors. The motion was seconded by Mr. Cox, and after a few remarks was adopted *nem. con.* A dividend at the rate of 4 per cent., making 7½ per cent. for the year, was then declared, and it was agreed that an interim dividend of 4 per cent. should be paid on the 1st of November next. The chairman and Mr. W. H. Davies, the retiring directors, were then re-elected, and Mr. Fry having been elected auditor in the room of Mr. Thomas Peacock, resigned, a vote of thanks to the chairman brought the proceedings to a close.

* By Messrs. Edward Lucas and Son, Dronfield, Sheffield.

Parliamentary Intelligence.

HOUSE OF LORDS.

MONDAY, MAY 22.

The Chairman of Committees informed the House that the opposition to the Stafford Borough Extension Bill was withdrawn. The orders made on the 5th and 18th inst. were discharged, and the bill committed.

TUESDAY, MAY 23.

The Lord Chancellor acquainted the House that the further Standing Orders applicable to the Kildwick Parish Gas Bill have been complied with; and that no further Standing Orders are applicable to the Stockton and Middlesbrough Corporations Water, and Whitehaven Town and Harbour Improvement Bills.

The Blackrod Gas Bill was reported, with amendments.

The Walsall Gas Purchase and Borough Extension Bill was reported from the select committee, with amendments.

The Huddersfield Water and Improvement, Paisley Water, and Tunbridge Wells Gas Bills, brought from the Commons, were read the first time, and referred to the Examiners.

The Edinburgh and District Water Bill was returned from the Commons, agreed to, with amendments, which were considered and agreed to.

The Rossendale Union Gas Bill was returned from the Commons with the amendments agreed to.

The Local Government Provisional Order, Skelmersdale (No. 5) Bill, was read a second time, and committed to a committee of the whole House.

FRIDAY, MAY 26.

The Lord Chancellor acquainted the House that the further Standing Orders applicable to the Slaithwaite Gas and South Hants Water Bills have been complied with.

The Llandudno Improvement Bill was reported from the select committee with amendments.

The Redcar and Coatham Gas, Gorleston and Southtown Gas, and Chesterfield Water and Gas Bills were reported, with amendments.

The Gas and Water Orders Confirmation (Chapel-en-le-Frith, &c.) Bill was reported from the select committee, without amendment, and referred to a committee of the whole House, on Monday, May 29.

The following Bills, brought from the Commons, were read the first time, and referred to the Examiners:—Bristol United Gas, Dewsbury and Heckmondwike Water, Lancaster Water and Improvement, Rosstrevor Improvement, Spennymoor and Tudhoe Gas.

The Local Government Provisional Order, Skelmersdale (No. 5), Bill passed through committee of the whole House, and was reported, without amendment.

Petitions against the following Bills were presented:—Kildwick Parish Gas Bill from Keighley Local Board; Stockton and Middlesbrough Corporations Water Bill from (1) Corporation of Darlington, (2) Stockton and Middlesbrough Water-Works Company, (3) Owners, &c., of property affected by the Bill, (4) Manufacturers, traders, and others, being consumers of water within the district supplied by the Stockton and Middlesbrough Water-Works Company, (5) Hartlepool Gas and Water Company; Whitehaven Town and Harbour Improvement Bill from Steamship Owners Association of London.

HOUSE OF COMMONS.

MONDAY, MAY 22.

The following bills were reported:—Burntisland Burgh, Norwich (City) Water, Tipton Local Board, Plymouth Dock (Devonport) Water.

The Lords amendments to the Rossendale Union Gas Bill were agreed to.

The Edinburgh and District Water Bill (Lords) was read the third time, and passed, with the amendments.

The Huddersfield Water and Improvement Bill was read the third time, verbal amendments made, and passed.

The Paisley Water and Tunbridge Wells Gas Bills were read the third time and passed.

The following bills, as amended, were considered and ordered to be read the third time:—Bristol United Gas (amendments made), Dewsbury and Heckmondwike Water (amendments made), Lancaster Water and Improvement, Rosstrevor Improvement (three clauses added and amendments made), Spennymoor and Tudhoe Gas.

The Gas and Water Orders Confirmation Bill (Lords) was read a second time, and committed for Thursday, June 1.

A petition against the Metropolis Gas Companies Bill was presented from Consumers of gas of the South Metropolitan Gas Company in St. Giles's, Camberwell.

Petitions against dispensing with the Standing Orders in the case of the petition for additional provision in the North-East Worcestershire Water Bill were presented from (1) Owners, &c., and ratepayers in Bromsgrove, (2) Robert William George and Frederick Richard Brown; and one in favour of the proposed additional provision from the Bromsgrove Local Board.

Mr. ALEXANDER BROWN gave notice that on Friday, June 16, he would call attention to the final report of the Rivers Pollution Commission as regards the supply of water for domestic purposes in rural districts, and ask the President of the Local Government Board what further steps he proposes to take to remedy the existing evils.

TUESDAY, MAY 23.

The Gaslight and Coke Company, Newcastle and Gateshead Water, and Smethwick Local Board Bills, as amended, were considered; to be read the third time.

The Wakefield Water and Colney Hatch Gas Bills were reported.

The following resolution, reported from the Standing Orders Committee, was agreed to:—"That, in the case of the North-East Worcestershire Water Bill, petition for additional provision, the Standing Orders ought to be dispensed with. That the parties be permitted to introduce their additional provision accordingly, if the committee on the bill shall think fit.

MR. PATTERSON'S PATENT FOR SULPHUR PURIFICATION.

Colonel MAKINS: I wish to ask the President of the Board of Trade what steps were taken by the Board of Trade when they were informed that Mr. R. H. Patterson, one of the gas referees appointed by them under the Act of 1868, had taken out a patent for "Improvements in the Purification of Coal Gas" on the 9th of March, 1872, while he held the office of a gas referee? If he will explain to the House for what reasons Messrs. Patterson and Peirce, two of the referees, were superseded in their office, in August, 1872, and Dr. Tyndall and Mr. A. G. Vernon-Harcourt appointed in their places, the said office of gas referee not being abolished or reconstructed in any way; the powers remaining the same as heretofore, but the emolument only being diminished? And, whether he is aware that in the recent action, *Patterson v. The Gaslight and Coke Company*, the Lords Justices of Appeal condemned in strong terms the withholding of the gas referees report, dated the 31st of January, 1872, but which the Board of Trade did not receive till the 26th of March, 1872, between which dates Mr. R. H. Patterson obtained his patent of the 9th of March, 1872, for the system of purification recommended and suggested in that report, and, as stated in evidence, with the sanction and approval of the other two referees; and, if so, what steps he has taken to ascertain the truth of this statement?

Sir CHARLES ADDERLEY: The Board of Trade first saw in the JOURNAL OF GAS LIGHTING of March 26, 1872, notice of a patent taken out by Mr. Patterson, one of the gas referees. On the 23rd of April, the Board wrote to Mr. Patterson inquiring whether he was the person referred to in the notice, and, if so, what was the nature of his patent. Mr. Patterson explained that it was not his intention to make any substantial charge for his patent to the companies with which he was officially concerned. The Board of Trade said it was questionable whether a public officer ought to make use of knowledge and experience acquired by him in the discharge of his public duties to establish a claim to a patent. When the patent, if successful, was one which could or might be purchased by manufacturers whom it was the duty of the officer to control, to be used by them for the purposes of a process which he was appointed to regulate, there could be no doubt that the holding of such a patent by such an officer was inconsistent with his public duties. Messrs. Patterson and Pierce were informed on the 23rd of April, 1872, that they would not be reappointed after the expiration of their annual appointment, in August, 1872; but the circumstances are too long to be stated in answer to a question. I am aware of the language of the Lords Justices of Appeal in the recent case of *Patterson v. The Gaslight and Coke Company*, but as the referees referred to ceased to be the servants of the Board of Trade in 1872, I do not find it necessary to take any further steps in the matter. If the honourable gentleman will move for the correspondence on this subject, it shall be laid on the table.

On Friday Colonel MAKINS gave notice that, on Monday, May 29, he would move for the correspondence referred to.

WEDNESDAY, MAY 24.

The Southampton Gaslight and Coke Bill, as amended, was considered; to be read the third time.

THURSDAY, MAY 25.

The following bills were read the third time, and passed:—Bristol United Gas, Dewsbury and Heckmondwike Water, Lancaster Water and Improvement, Rosstrevor Improvement, Spennymoor and Tudhoe Gas.

FRIDAY, MAY 26.

The following bills were reported:—Kirkcaldy Burgh and Harbour, Leigh and Hindley Local Boards (Lords), North-East Worcestershire Water, Uppingham Water, West Bromwich Improvement, South Metropolitan Gaslight and Coke, Campbeltown Burgh and Harbour, Southport Improvement.

The following bills were read the third time, and passed:—The Gaslight and Coke Company, Newcastle and Gateshead Water, Smethwick Local Board.

HOUSE OF COMMONS COMMITTEES.

TUESDAY, MAY 16.

(*Before Mr.* J. WALTER, *Chairman*; *Colonel* STUART, *Mr.* KNOWLES, *and Mr.* RYDER.)

THE GASLIGHT AND COKE COMPANY'S BILL.

Serjeant SARGOOD, Q.C., Mr. RICHARDS, Q.C., and Mr. BROUGHTON appeared for the promoters; Mr. CRIPPS, Q.C., Mr. PHILBRICK, Q.C., and Mr. O'HARA for the Metropolitan Board of Works; Mr. VENABLES, Q.C., and Mr. ROUND for the London and St. Katherine's Dock Company, petitioners against the bill.

Serjeant SARGOOD, in opening the case, said that although the proportions of the bill were very massive, the points in dispute had been all arranged, with the exception of one which related to the application of the company for compulsory power to take land for the purpose of enlarging their works. That application was twofold, because the promoters asked for land in two distinct places, and in the first they were opposed by the Metropolitan Board, who were the owners of the land, and in the second by the London and St. Katherine's Dock Company, not as owners—all the owners concerned having been settled with—but as proprietors of land adjoining that which the promoters asked power to take. Before entering upon a consideration of this disputed point, it would be well to give the committee a short outline of the position of the company with respect to the whole bill. The Gaslight and Coke Company, who were the promoters, were the oldest company in the Metropolis, having been established so long ago as 1810. Without going into the history of the company, he might come at once to the years 1866-7-8, when this company, with the other gas companies of the Metropolis, being in active operation, a great deal of public excitement was got up on the gas question, and strong efforts were made to put them under certain restrictions. So early as 1847 a public Act was passed, called the GAS-WORKS CLAUSES ACT, to which all the companies were subject; and in 1860 another public Act was passed for regulating, in the interests of the consumers, the enormous undertakings of the London companies. Prior to the passing of the last-named Act, the companies, who originally competed with each other in the supply of gas, entered into districting arrangements, the propriety of which was confirmed by Parliament. In 1866 a committee of the House of Commons were appointed to consider the Metropolis gas question, and in the two following years committees presided over by Mr. Cardwell took this question into consideration, the result being that in the latter year an Act was passed, called the City of London Gas Act, which gave power to the companies supplying the City to amalgamate, and contained various provisions for regulating the price and quality of gas. The promoters of the present bill accepted the terms of that Act, and, under its provisions, amalgamated the two other City companies. In addition to that, they accepted clauses in their own private Act of that year, extending the provisions of the City of London Gas Act to all parts of the districts outside the City within the area of their supply. By their own Act they also obtained power to erect very extensive works down at Beckton, close to the outfall of the main drainage on the north side of London. In 1870 they purchased, by the authority of Parliament, the Victoria Docks Gas-Works, and in the following year they obtained an Act for making a railway to connect their works at Beckton with the railway system of the eastern counties, so as to facilitate the carriage of coal and other materials required in their operations. They also obtained power to absorb the undertaking of the Equitable Company. In 1873 they again came to Parliament, and obtained power to raise a further capital of £1,000,000; and in the present year, under the powers of amalgamation already possessed by them, they had absorbed the enormous undertaking of the Imperial Gas Company, and also that of the Independent Company. Notwithstanding all the concessions made by them to the public from time to time, the gas agitation still went on, the consumers being never satisfied, the result being that last session there was another great gas fight in a committee of the House of Commons, presided over by Mr. Forster. That investigation extended over three weeks, and it seemed that Mr. Forster did not altogether sympathize with the views of Mr. Cardwell, as he, with his committee, intimated their intention of effecting very material alterations in the legislation which had been the creation of Mr. Cardwell's committee. The promoters, with other metropolitan companies, boldly opposed the proposed new legislation; but one company—the Commercial—accepted the terms, they having a bill of their own before Parliament asking for powers which they could not do without. For want of time no public Act was passed last year; but that which would have been a public Act was pretty well shown by the amendments which the committee forced upon the Commercial Company. The promoters of the present bill, however, had done as they did before; they had taken the initiative in adopting those conditions which a parliamentary committee had intimated were the proper conditions for the public protection,

and had inserted in their bill the terms which were settled last session, together with other provisions which it was thought right to incorporate. The bill had, therefore, received the approval of the Board of Trade and the Metropolitan Board of Works, as well as that of the Corporation of the City, so that this committee would not be troubled with any discussion upon the general gas question, but have their attention confined to the one point he would now bring before them.

Mr. CRIPPS said, as the Board he represented appeared upon a petition which raised a great number of different points, he thought it right that he should take this opportunity of stating, on their behalf, that he endorsed to the fullest extent all that his learned friend had stated. The questions which would have been raised by his petition had all been entirely arranged by the Metropolitan Board and the company, with the assistance and under the superintendence of the Board of Trade. The Metropolitan Board were only now present as landowners, to resist the taking of a piece of their land for the purposes of the gas company.

Serjeant SARGOOD said the land belonging to the Metropolitan Board which it was desired to acquire, was land adjoining the Beckton Gas-Works. It was land which the Board were not at present using, but which, in their petition, they stated "may probably be required in connexion with the main drainage outfall at or near Barking Creek," and they submitted to the committee "that no compulsory powers should be given to the company over such land." So that the strongest case they set up was, that they had the land, and possibly it might be wanted. The case on the part of the company was that, in the interests of the public, whose servants they had become by the onerous obligations they had undertaken, they wanted the land, and, under the exigency of the accumulated burdens Parliament had put upon them, they could not go on unless they received power to acquire it. It would, therefore, resolve itself into a question of evidence, whether the Board could show such a paramount necessity for its retention as should stop the promoters from its acquisition, or whether the company could show such a necessity for its acquisition as should disable the Board from effectively opposing the progress of the bill. There was an allusion in the petition to a right of way along the embankment at Beckton, giving access to the drainage works, to which he would just allude. When the company's bill was in Parliament, in 1868, a clause was inserted providing that, "if any right of way along the embankment exists, giving access to the drainage works of the Metropolitan Board of Works, the company shall not stop up such right of way," &c. The company assented to that clause, because at the time they did not know sufficient of the estate they were acquiring, or of the rights connected with it, to be sure whether or not such right of way existed; but they perfectly well knew now that no such right existed, and they were not inclined to give way to the suggestion about this old grievance. The utmost the Board ought to ask was that, if such right existed, it should not be prejudiced. The promoters were quite prepared to concede that, because they knew perfectly well that there was no such right. The piece of land which the company desired to acquire was the scene, some years ago, of some celebrated sewage irrigation experiments, carried on by a public company which had subsequently come to grief. Since those experiments had ceased the land had been wholly unused. He did not mean to say that the Board were not justified in seeking to retain it for themselves in case they should require it, and it would be for the committee to decide between the parties, when they had heard the evidence, as to the necessity for its transfer to the company. There would be no question, in the present instance, as to any persons suffering inconvenience from the operations of the company if carried on there; it was a simple question whether they had such a case as would warrant the grant of the compulsory powers they asked for. The drainage works of the Board and the gas-works of the company were a couple of nuisances side by side. Which might be the better for outsiders—gas or sewage—it was not necessary to decide; and the question was one entirely between the promoters and the petitioners. He was, however, reminded that when last year the Metropolitan Board brought in a bill for having gas-works of their own, one of the pieces of land scheduled by them for the purpose of works, was the identical piece now in dispute. Its suitability, therefore, on the one hand, could not now be questioned; while, on the other, its practical inutility was obvious from the fact that up to the present moment it had remained idle, and as the Board had scheduled it for gas-works in connexion with their own scheme, it was clearly not their intention to adapt it for sewerage purposes. Their idea of the space required for establishing competing works for the supply of London was shown by their proposal to take 716 acres; it was evident, therefore, they did not at all under-rate the importance of a large area for such an enormous undertaking, whether in their hands or in the hands of the company. No doubt they also felt, as the company did, that one important feature connected with this land was that it gave them a water frontage, the increasing necessity for which, to meet the enormously growing trade of the company, was constantly manifesting itself. The other petition against the bill was from the St. Katherine's Dock Company, in opposition to the acquirement a piece of land near the Victoria Docks. In this case the petitioners were not the owners of the land, but the neighbours of the owners, and they claimed to be heard under the 27th Standing Order, which provided that "every owner and occupier, or lessee of any dwelling-house within a distance of 300 yards of the place where gas is proposed to be manufactured, shall have notice of such proposal." Now, although the land of the petitioners adjoining that proposed to be taken was a piece of marsh land, there appeared to be a small house upon it—or was when the bill was lodged—and this gave the petitioners a *locus standi*, but he was informed that the house since then had ceased to exist. The petitioners stated the circumstances under which they acquired their land, and they alleged that this land "will afford convenient sites for streets, dwelling-houses, hotels, taverns, churches, and schools, and your petitioners have always intended, and now intend, to appropriate and have laid out the said land accordingly, and have made roads with that object, and have received offers from persons willing to occupy the said land." Then they proceeded to state that by so using the land they expected to derive a large revenue, but that the use of the adjoining land for the purpose of gas manufacture would greatly depreciate the value of their property, and any building that might be erected thereon. They further objected that the goods and merchandise in their docks, quays, and warehouses would be "liable to injury, by reason of the effluvium from the intended gas and other works of the promoters," and they also further alleged that there were numerous other sites which the gas company might acquire convenient and suitable for their purpose. But the real question for the committee was, whether, Parliament having cast great responsibilities upon the gas company, they were to be stopped from carrying out necessary enlargements of their works merely because the dock company, having some sort of a house within 300 yards (without which they would not be entitled to oppose), chose to come before the committee and say that they had it in their minds at some future time to build houses, and schools, and churches, and so on, to which these extensions might prove objectionable. When he reminded the committee that The Gaslight and Coke Company were the largest gas company in the world, that they had no less than ten manufacturing stations at work at this moment, that in 1868 they bought about 150 acres of land under the powers then given to them, occupying an enormous part of this district, and that the land they now proposed to schedule was calculated to last them not more than for 10 years to come, they would see at once the importance of the company not being estopped in their reasonable endeavour to meet the necessity of the times, and to acquire such additional land as was necessary for the manufacture of gas, the conversion of residual products, &c., which the enormous demands of the Metropolis made upon them. He was told that at the present time the company carbonized about one million tons of coal per annum, and that the normal rate of increase meant 60,000 tons, so that it would be seen that the acquisition of the requisite space on which to carry on their operations was a matter of life and death to them.

The Hon. *Richard Howe Browne*, examined by Mr. RICHARDS.

I am the Governor of The Gaslight and Coke Company, and was for some years Deputy-governor of the Chartered Company. The bill now before the committee is substantially the same as the bill of the Metropolitan Board as amended by the committee last year. It has received the sanction of the Metropolitan Board and the Board of Trade, and is unopposed except as to the compulsory purchase of land. It is absolutely necessary that we should have power to acquire the piece of land by the outfall sewer for the purpose of our undertaking. Through our recent amalgamations the production of gas by our company has been doubled. Last winter the greatest quantity of gas produced by the Chartered Company in 24 hours was 27 million cubic feet; the productions of the Imperial and Independent Companies, which we have since amalgamated, were 23 millions and 3½ millions respectively. The principal station of the company is at Beckton, which, from its position, enables us to manufacture gas most economically. It has the advantage also of being eleven miles from London. When we first obtained the land for that station we thought we had taken enough; but the demand for gas has since gone on rapidly increasing. The present rate of increase is six per cent. It has, therefore, become necessary to increase the station. Our present water frontage there is quite inadequate. I have seen the quay entirely choked with craft. [Witness pointed out the other stations of the company.] In order to meet the requirements of the referees, we have to use lime in the purification of our gas. We have two lime-kilns at Beckton. We find it economical to manufacture our own lime. We save about 1s. 3d. per cubic yard by so doing, and we use hundreds of thousands of yards in the year. It is also desirable that we should be able to work up the old iron not only from this, but from our other stations. We obtain our retorts from Stourbridge and Newcastle principally, and there is no doubt that we should be able to effect considerable economy if we were able to work them up on our own premises. We should also get them in much better order, as they suffer very much in transit. If we could manufacture sulphate of ammonia, we should also economize the cost of making gas. We have invited tenders for one million tons of coal this year, which will be the minimum of our consumption. The production of gas by the united companies on the heaviest day last winter was about 55 million cubic feet. The production of the heaviest day multiplied by 200 gives very nearly the annual consumption. Adding 6 per cent. for increase, it will represent 10,000 million cubic feet as the production of this year. We have a pier at Beckton for the discharge of coals. These coals being hoisted out of the ships which lie alongside, are put upon a tramway which conveys them to the various retort-houses. We propose to construct a line of railway to supply coal to our Bromley works from Beckton. The quantity of land we originally took at Beckton was 150 acres, and we now propose to add 200 to that. We calculate that these 350 acres will be sufficient for our purposes for the next ten years. The markets for tar and ammoniacal liquor are at present limited—*i.e.*, the trade is with few firms, and we are completely in their hands. It is desirable that we should become manufacturers ourselves, as we should thereby derive an increased revenue, which would keep down the price of gas. Everything that tends to improve our revenue helps to diminish the cost of gas. We have been diminishing the number of our urban stations since the erection of the Beckton works. The Blackfriars station has been done away with; the Horseferry Road station ceases to be a gas manufactory; the Curtain Road station has been removed, and the Brick Lane works are no longer a manufacturing station. The tendency, therefore, of our policy is to remove our works as far as possible from the heart of the town. The land of the Metropolitan Board which we ask power to acquire at Beckton is most appropriate for our purpose. It has been let to the Essex Reclamation Company as a sewage farm; but that company are now being wound up. In one of the bills which the Metropolitan Board introduced last year they scheduled this piece of land for gas purposes.

By the CHAIRMAN: The area is 24 acres, and the frontage to the river about 980 feet.

Examination resumed: The Board have plenty of land on the other side of the sewer, which, for their purposes, they could more advantageously employ. That land would be no use to us, as a river frontage is a most important thing to a gas company. The whole of the land at Beckton is low and marshy, and there are sulphur and ammonia works as well as the sewer outfall in the immediate neighbourhood. We should embank the whole river frontage of the land we ask for. At present it is 5 feet below high-water mark. With reference to the right of way at Beckton, it will be proved in evidence that there is none. The only people who have any interest in going across that part, are those employed at the outfall sewer—eight or ten persons in all. As to the other piece of land which the dock company object to our taking, I know the building within the 300 yards, on their property. It is a small homestead, or farm, a black wooden house. I do not know what it was built for—a part only of it exists now. There is not another house anywhere near. The land we propose to take there has a river frontage about equal to our present frontage at Beckton—viz., 1300 feet. We expect to get 1300 feet again to the westward, and again about 980 feet to the eastward. It is essential to the satisfactory carrying on of our works, that we should have it, and I have not the slightest doubt that in a year or two we shall require the whole of that frontage. The ground there is marshy below the level of high-water mark, and there is a wall facing the river. We have also scheduled some land at the west end of London—at Kensal Green; there is no opposition to that. The object is to convert a portion of some leasehold land we have there into freehold.

Cross-examined by Mr. PHILBRICK: I am not aware that until this year the land upon which the Essex Reclamation Company carried on their experiments was tied up to them, and could not be touched by the Board of Works until this year. If the Board want to extend their sewage reservoir, they could do so farther down. I do not know that all the river frontage between Barking Creek and the sewer is used by the present reservoirs. Supposing it all to be so occupied, there is no other land for extension than these 24 acres. With regard to the right of way, it certainly does not coincide with my idea, that instead of nine or ten persons passing over it daily there are 500 each way.

Mr. PHILBRICK proceeded to cross-examine witness as to what was intended to be done by the company in respect to this right of way, but

Mr. RICHARDS objected that it was not a matter which could be decided by the committee, and witness should not be asked questions which might prejudice the rights of the company elsewhere.

The CHAIRMAN said the question was irrelevant, and the committee thought it would be better to deal only with the comparative importance of the land to the company and the Board.

Cross-examination continued: About one-fourth of our present production of gas is made at Beckton. There is not much of the 150 acres we took there which is unoccupied by works. We commenced with four retort-houses, and are now erecting the tenth. I will not pledge myself that we shall give up any of our manufacturing stations, but we hope to do so. Our western works at Kensal Green are very large. At Bromley there are many acres of land around our station still unoccupied. It is a very large station, but I do not know how much land is unoccupied. I cannot exactly answer the question; but I should say that we manufacture gas at Beckton at the present moment cheaper than at Bow. That has been so within the last year.

Mr. ROUND rose to cross-examine witness, but

Mr. RICHARDS objected to the *locus standi* of the St. Katherine's Dock Com-

pany, on the ground that the building which had been situated upon their land, and which alone entitled them to receive notice, under the 27th Standing Order, had been demolished since the notice was served upon them. He referred, in support of his objection, to the St. Mary Church Local Board Bill, on which it was clearly decided that, whilst a landowner, being the owner, lessee, or occupier, within 300 yards of the land proposed to be taken for gas-works, is entitled to notice; the occupier of the land, when there is no such house, is not entitled to such notice, merely because he is the landowner. If the present circumstances of the dock company—*i.e.*, the mere existence of the house—had been the same when the petitioners were before the *Locus Standi* Committee, their right, upon the authority just quoted, would have been disallowed. In a case which he (Mr. Richards) was engaged in a short time previously the petitioners—the Keighley Local Board—had obtained a *locus standi* upon a gas bill, in a district which a company sought power to light; but in the meantime the company entered into an agreement with another company, by which they undertook not to go into this particular district, and he showed to the select committee that that agreement had been entered into, and it was at once held that this altered state of circumstances deprived them of a *locus standi*.

Mr. ROUND said he would admit the fact with regard to the removal of the house; but he must submit that if, on that account, the dock company were deprived of a hearing, very great injustice would be done to them. The committee would be satisfied, by an examination of their petition, that his clients had a very substantial grievance; and he was sure they would not, unless forced by the technical rules of the House, do that which would be very injurious to their interests. No doubt one of the grounds upon which the dock company were entitled to be heard was the existence of this house; but the petition itself was upon merits. The destruction of the house, which was now sought to be made a reason for resisting their *locus standi*, had taken place in the progress of the works detailed in the petition, and which, it was alleged, would be enormously depreciated if the gas company were allowed to take the adjoining land for their manufacture. The petitioners had been advised that their case was not one in which, under the 68th section of the Lands Clauses Act, they could recover compensation on account of being injuriously affected by the operations of the gas company, and, therefore, their only remedy was to come before Parliament and ask that the bill might be thrown out as uncalled for and unnecessary. If, however, the committee should hold that there was anything in the objection of his learned friend, he would ask them to exercise their power under the 99th Standing Order, to send the case back to the referees, who, with the approval of the chairman of Ways and Means, might examine into it, and certify their decision to the chairman of the committee. As to the precedents quoted by Mr. Richards, it was perfectly well known that the referees were not guided by precedents in any case, but looked upon each according to its substantial merits. He repeated, that the only way in which justice could be done to his clients, was to allow them to be heard before the committee, and inasmuch as they could not recover compensation when damage was done, he hoped they would not allow a technical objection to the *locus standi* of the petitioners to prevail.

Mr. RICHARDS, in reply, said his learned friend had not touched his objection. He talked about the hardness of his case; but he forgot that he was only before the committee at all because of the wretched hovel on the land of the petitioners, which had now ceased to exist. He obtained his *locus standi* entirely upon a purely technical ground, and he was now bound to prove himself technically right. The committee had nothing to do with the question of hardship; and as to their not being able to get compensation, it was only because they were not persons who would be injured. He (Mr. Richards) again referred to the St. Mary Church case, and maintained that the Court of Referees were always guided by precedent, the express object of establishing that court being that there should be something like uniform legislation in those cases.

The room was then cleared, and on the parties being again called in,

The CHAIRMAN said: The committee are of opinion that, having reference to the altered circumstances of the case with regard to the building in question, the St. Katherine's Dock Company have no longer a *locus standi* before the committee.

The Hon. *Richard Howe Browne*, re-examined by Mr. RICHARDS.

I see no difficulty, speaking not as an engineer, in the Board of Works extending their reservoirs upon the other side of the outfall sewer. The Beckton production of gas represents about one-fourth of the total, and our object is, as years roll on, to make the amount larger. For that purpose we seek further territory. There is land to spare at the Bromley station; but Bromley is two or three miles up the river Lea, so that coals cannot be delivered there so economically as at Beckton. One of our schemes is, in course of time, to have a railway to convey coals from thence to Bromley. There are about thirty acres of land lying back from the river at Beckton at present unoccupied.

By the COMMITTEE: We do not contemplate making manure from ammonia at Beckton. We shall work up the residual products for sale in the markets. For working up our old iron we intend to have a blast furnace.

Mr. RICHARDS: As a matter of fact, there are two or three Jews in the market at present, who have a monopoly of the trade, and you can get nothing at all for your old iron?

Witness: No, practically.

Mr. *George C. Trewby*, examined by Mr. BROUGHTON.

I am a member of the Institution of Civil Engineers, and engineer at the Beckton works. I reside there. I have heard the evidence of the governor of the company, and confirm that evidence in every particular. I have been connected with the company for than 20 years, and have been engineer at Beckton ever since we commenced making gas there. The rate of increase in the production there is about 6 per cent. annually upon the previous year. About 350,000 tons of coal are carbonized at Beckton alone every year. I believe all the land we have scheduled will be required in the next ten years. That is all the land available in the neighbourhood. I have made some calculations with regard to the increment of the manufacture during the next ten years. The consumption of gas at all the stations of the amalgamated companies on the biggest day of last winter was 57 million cubic feet.

The CHAIRMAN said the committee would like to be informed in detail of the manner in which the land proposed to be taken would be appropriated.

Mr. BROUGHTON said he would prove that.

Examination continued: Taking the essential increase of production in the winter of 1886-7, the total of the heaviest day would be 102 million cubic feet, of which the proportion due to Beckton would be 66,450,000. The land we propose to take is part on the east and part on the west side of the works. That in the east will be devoted to the manufacture of residuals and their shipment. It will be the least nuisance to other people there. It is close to the Metropolitan Board's outfall sewer and to Lawes' extensive chemical factory, which, as I live at the works, is a very great nuisance to me when the wind blows from the east. We have eight retort-houses finished, the ninth nearly finished, and the tenth in course of construction. These ten houses are capable of producing 27 million feet of gas per day. We should require 20 retort-houses, or more, to produce the 66 millions. Our retort-houses are each 360 feet long and 90 feet wide. We should place our blast-furnaces in the east of the works, if there is room for them. They would not constitute a nuisance. I think we shall require the whole of the 24 acres for the tar and ammoniacal liquor-works without giving any of it for the manufacture of retorts. The additional retort-houses will come near the docks.

By the COMMITTEE: In the north-western angle of the land we have room for some more retort-houses, and we are bound to find room for our refuse lime, a large quantity of which we turn out every year, and for which there is no market at the present time.

Cross-examined by Mr. PHILBRICK: Part of our proposal is to use the 24 acres for the manufacture of residual products. We also want additional river frontage for loading and unloading. With our present pier, machinery, and appliances we are able to unload 1000 tons of coal within a tide. I have stated that the average increase in demand for gas is about 6 per cent. I dare say in some past years it has been less. In districts where building has been developing of late, and manufactories increasing, it would be more than that. I am not prepared to say what it is in the City of London, apart from the rest of the Metropolis. The works we have taken over from the Imperial and Independent Companies, in consequence of the amalgamation, would not be sufficient to supply those districts. They will have to be supplied from Beckton. There is no room to extend the Independent works. The Bromley works might be enlarged to almost any extent; they could certainly be doubled. We are not at present supplying from Beckton any other districts than those of the Chartered Company before the last amalgamation, but we propose to do so immediately. We shall put up a gasholder at the Bromley works, and fill it with gas manufactured at Beckton.

Re-examined by Mr. RICHARDS: The amalgamation was only confirmed in March, therefore, it is rather too soon to pledge the company as to their future course of operations. The site of the Bromley works covers a good many acres, but it has the disadvantage of being in a situation which makes the delivery of coal more expensive than at Beckton. We contemplate making as much as 60 million feet of gas a day at Beckton in 1886-7, which means carbonizing 6000 tons of coal. In the depth of winter it is desirable to take in as much coal as is required for each day's carbonization, so as not to diminish the stock upon which we depend, in case of frost or prolonged fogs. We are unloading now about 1700 tons a day on the average, and with that quantity only we find our quays continually blocked up. It is therefore essential to the conduct of our works that we should have the river frontage asked for in this bill. The yearly increase in the demand for gas in the old Imperial district has been as much as 10 per cent.. The company have no option to refuse a supply of gas on demand wherever they have mains, and, therefore, they must have works adequate to meet all claims upon them. With the exception of Bromley, all the stations of the company are almost wholly occupied.

The CHAIRMAN: Have you come to any conclusion, founded upon your own knowledge and experience, of the quantity of land required for the manufacture of gas and the conversion of residual products for any given number of thousands of feet?

Witness: In our case, as our works are laid out there, it runs to something like four acres, or a little more for every million cubic feet.

Mr. RICHARDS: Many of the works in the centre of the town have nothing like that?

Witness: No.

Mr. PHILBRICK: Would that include the necessary storeage?

Witness: Yes; a little over four acres would include everything.

Mr. *Horatio Brothers*, examined by Mr. RICHARDS.

I am the engineer of the western station of the company, and before the amalgamation of the Equitable Company I was engineer to that company. I have had 32 years experience of gas-making in London and the provinces. I am thoroughly acquainted with the whole question of metropolitan gas supply. I know the works at Beckton, and confirm the statement made by Mr. Trewby that they will require the whole of the land scheduled there in the next ten years. I agree also in what was stated by him as to the greater economy in landing coals at Beckton than at Bromley, which is two miles up the river Lea, and involves great expense for lighterage. I agree also with what Mr. Trewby said as to the requirements of additional river frontage, and the propriety of the manufacturing operations intended to be carried on there. The land scheduled at Kensal Green is 25 acres, some of which is now in our possession on lease, and is covered with buildings. Our object is to convert the leasehold there into freehold. About 12 acres out of the 25 are occupied at present. The distance from Kensal Green to Beckton by road is about 16 miles. The land we are asking for at Kensal Green is not more than we shall require, it will hardly be sufficient. The greater part of the west of London is now supplied from Beckton, in addition to the supply from Kensal Green. The Fulham station has enormous mains running up into Marylebone. All deficiencies in the supply, at the several smaller stations, must be made up from Beckton, where gas can be made 6d. per 1000 cheaper, owing to the cost of coal being less. The real annual increase in the demand for gas at the west end of London is 10 per cent. and upwards; in the City it is about 3, and the average of the whole is about 6 per cent.

Cross-examined by Mr. PHILBRICK: There are no gas-works having a river frontage on the north side of the Thames except Beckton and Pimlico. The latter is a small cannel-gas station, with a small river frontage. I do not know of any company within the metropolitan boundary who manufacture their own residuals; but it is very common in the country. Most of the works in towns, however, are so circumscribed in area that there is not the opportunity for doing it, though I believe the companies would be very glad if they could, because of the extra profit. But, clearly, in a crowded locality, it would not do to manufacture sulphate or carbonate of ammonia. One of our great difficulties in the manufacture of gas is to get rid of the sulphur impurities other than sulphuretted hydrogen. We are limited by Act of Parliament as to the quantity which may be left in it; and to bring it down within that limit involves the use of lime, which, when it has done its work, and has to be removed, is necessarily offensive. The evaporation of the sulphuric acid in the manufacture of sulphate of ammonia would not be very pleasant.

Re-examined by Mr. RICHARDS: I know that the Corporation of Glasgow manufacture the residual products at their gas-works. The manufacture of gas at our Pimlico station is restricted by Act of Parliament. The Fulham works are also restricted by an Act of Parliament passed under the influence of the Bishop of London. The great nuisance that has arisen with regard to lime has been in consequence of the referees demanding an excessive purification from sulphur; and, incidental thereto, I may say that the purification of 100 million cubic feet of gas in the year necessitates having 20 acres of land upon which to deposit the refuse lime a yard thick. A good deal of the land at my works is covered with the refuse lime alone, all of which was unnecessary before the referees fixed so low a maximum for sulphur impurity.

By the COMMITTEE: We can neither give the refuse lime away nor sell it. The consequence is, we are obliged to have land to tip it on.

By Mr. RICHARDS: At Beckton we are filling up the ground with it. I have offered to give it away, but can find no one to take it. There was some demand for it for agricultural purposes at one time, but the demand was not continuous. We require a considerable space for storing our coke. We have had as much as 40,000 chaldrons at Beckton at one time. It deteriorates by being stored. In addition we have large quantities of land covered with breeze. The four acres I mentioned as the quantity of land required, per million cubic feet of gas made, does not include the space required for spent lime, but merely for plant.

WEDNESDAY, MAY 17.

Mr. VENABLES applied on behalf of his clients, the St. Katherine's Dock Company, to reopen the question of *locus standi*, which the committee had decided against them on the previous day. He stated that they were taken by surprise at the objection then made, and were not prepared to support their position by referring to cases.

Mr. RICHARDS objected to the question being reopened, the committee having already decided the point.

The CHAIRMAN said if the learned counsel had any new point to bring before the committee, they were ready to hear it.

Mr. VENABLES referred to the case of the Alliance and Dublin Consumers Gas Bill, decided on the 8th of May, 1871 (2 Clifford and Stevens, p. 176), in which an owner of land within a distance of 300 yards from the proposed works was admitted to a *locus standi*, although there was no dwelling-house upon his land within that distance. He submitted that, upon the same ground, his clients might be admitted to a *locus standi* in this instance.

Mr. RICHARDS urged that the particular case quoted did not affect the general law upon which the matter was decided on the previous day, inasmuch as in that case it was proposed to repeal a restriction which had been imposed upon the company under their special Act, whereas there was no such restriction in any of the Acts of the promoters of the present bill.

The room was then cleared, and on the parties being called in,

The CHAIRMAN said: The committee are clearly of opinion that the petitioners have no *locus standi* against this bill.

Mr. RICHARDS said he did not propose to call any more evidence for the promoters.

Mr. PHILBRICK said he would call his witnesses for the Metropolitan Board before addressing the committee.

Sir *Joseph W. Bazalgette*, examined by Mr. PHILBRICK.

I am the engineer-in-chief of the Metropolitan Board of Works. I have been so ever since the Board were created, in 1855, and for many years to their predecessors. I designed the system of main drainage for the Metropolis. [Witness explained in outline the leading features of the system.] At Barking, the Board have 77 acres of land altogether, which they acquired for the purpose of the outfall sewer. Of that land 52 or 53 acres are on the north side of the sewer, and the remaining portion are the 24 acres which the promoters of this bill propose to take compulsorily. It was occupied by the Essex Reclamation Company for a time, and under it their sewer was constructed; they occupied another piece for irrigation purposes. That company were not successful, and the Board endeavoured, but failed in their attempt, to get the land back again. This year it falls into their hands by efflux of time. I think it is certain that we shall have, at some time, to enlarge our reservoir in order to prevent the frequent discharge of sewage into the river at flood tide, and if we do, it is obvious that this is the only piece of ground upon which we can enlarge it.

By the COMMITTEE: The area of the present reservoir is 13 or 15 acres, and if we have to enlarge it, the western side is the proper place for the enlargement. It is near to the outfall sewer, it is near to the river, and therefore can have an outfall constructed into the river. It has been said that we can build a reservoir on the other side, near Barking Creek. If we did so, whenever an overflow took place upon the flood tide, the sewage would be carried up to Barking, and I think the inhabitants who already complain, would have grave cause for doing so then. I consider the loss of this piece of land would prevent the Board from carrying out in its full spirit their parliamentary obligation of diverting sufficiently the sewage from the Thames. The foreshore in front of this land is important to them also; that is where the outlet-pipes would be constructed. This land is the only piece available for the purpose.

Cross-examined by Serjeant SARGOOD: When the Metropolitan Board brought in a bill last year to establish competing gas-works, they had the assistance of my advice on the subject.

Serjeant SARGOOD: Is it the fact that the 24 acres we now seek to acquire for gas purposes were included in your schedule last year for gas purposes?

Witness: That is quite true.

Serjeant SARGOOD: Supposing you had succeeded with that bill, and had carried out, as I have no doubt you would have done, the implied intention of the bill, and had occupied these 24 acres for gas purposes, your ingenuity would have got the Board out of any dilemma about the sewage? Tell me how you would have set to work?

Witness: I never proposed to take that land and apply it for gas purposes at that time. What we proposed is a totally different thing from what is now proposed.

Serjeant SARGOOD: Why did you schedule that land?

Witness: Because we were to construct gas-works at the north of the reservoir, and it was very important we should have a communication between the works and the river. We could have had that communication, and could have constructed our reservoir at the same time. We hold that land now for sewage works alone; we should then have had power to utilize it for both sewage and gas-works. That is a totally different thing from your proposal to take it from us for gas-works, and prevent us from using it for sewage purposes at all.

Cross-examination continued: In my judgment, as an engineer, the time is not far distant when we should require to utilize this land. It would not get over the difficulty I referred to if the second reservoir were constructed at the north of the present reservoir, and connected with it by pipes. We want the river frontage for our purposes. If the gas company have not sufficient river frontage, they could meet that by making basins, and by other means of unloading. I do not know that the Metropolitan Board have been the principal movers in the effort to drive the gas companies out of London. I do not believe that that has been their object.

Re-examined by Mr. PHILBRICK: If this land is taken from the Board, and the existing reservoir has to be enlarged, it will involve a reconstruction entirely, at a cost of, probably, £400,000 or £500,000, and I conceive there would be great difficulty in doing it in that way.

By the COMMITTEE: The capacity of the present reservoir is about 6 million cubic feet. Supposing it to be quite full, it would empty itself during the ebb-tide into the river. If we had another reservoir to the north of the present one, and communicating with it, we could to some extent so increase our discharge-pipes as to empty both during one ebb-tide. There would be difficulties in arranging it, and I think it would be dangerous to make the whole discharge dependent on the present outlets. If we went further down the Thames with our reservoirs we should convert our present gravitating system of discharge into a pumping system.

Mr. *Baldwin Latham*, examined by Mr. O'HARA.

I am a civil engineer, and have directed considerable attention to water supply and sanitary matters. I have made myself acquainted with the portion of the scheme of the promoters of this bill that relates to the taking of the land belonging to the Metropolitan Board. I consider it would be very inexpedient, as matters now stand, with regard to the question of the discharge of sewage matters into the Thames, and the general condition of the drainage of the Metropolis. Every extension of the outfall works, to meet the growing necessities of the metropolitan area, must be to the west of Barking Creek, which is a navigable channel, and it would be very difficult to carry an outfall across it. The land the promoters seek to take is, in my opinion, invaluable for outfall purposes, and ought on no account to be parted with. Nothing could compensate the Board for the absolute loss of this site which must be required sooner or later. There is abundance of land at Barking which the gas company could acquire.

Mr. RICHARDS said there was no allegation of that sort in the petition, and he should object to the examination being directed to such a point.

Mr. PHILBRICK was heard in support of the line of examination, but

The CHAIRMAN said: It is not of the least use going into that at all. It is not for the opponents to suggest that the company could take lands elsewhere; they must know best themselves whether they can do so.

Witness, cross-examined by Mr. RICHARDS: I do not mean to say that every place in the neighbourhood of London will be at liberty to send its drainage into the metropolitan sewers at present, but, sooner or later, it must be so. I do not, of my own knowledge, know that the Tottenham sewage was refused, but I have heard so. I know that in the case of Hornsey, it was refused on one occasion, but they afterwards got it. I was not consulted by the Metropolitan Board last year about their gas bills.

Mr. *Rogers Field*, examined by Mr. PHILBRICK.

I am a civil engineer, and have had my attention directed particularly to drainage matters. I have advised a number of local authorities. I am acquainted with the outfall sewer at Barking. I think it most desirable that the Metropolitan Board should retain their 24 acres; in fact, I consider it essential. Their reservoir will soon require enlarging, and this is the natural spot on which to enlarge it. It would be an exceedingly difficult and expensive thing to increase the storeage capacity on the back land.

Cross-examined by Mr. RICHARDS: It is desirable, no doubt, that the gas company should have the land, but to what extent it is essential I can give no opinion.

By the CHAIRMAN: There would be considerable difficulty in increasing the means of discharge, at the outfall, so as to make the capacity equal to the requirements of two reservoirs instead of one, and it would involve the reconstruction of a portion of the present reservoir. The expense also would be very considerable. If a portion of the land were retained, sufficient to make an outfall, and the additional reservoir were erected on other land which the gas company do not seek to acquire, it would facilitate the operation, but, without going into details, I do not know to what extent. In neither case is there an insurmountable difficulty, but the expense would be considerable.

The CHAIRMAN: Where there is a question of great public convenience involved on both sides, and it is merely a question on whose side the balance of convenience rests, is it not desirable to be prepared to incur some expense to meet that difficulty, so as to prevent either side from being absolutely and seriously injured by any change of this kind?

Witness: Unquestionably. That is a point upon which I can give no opinion, with reference to the balance of convenience, I am afraid I do not exactly understand the question.

The CHAIRMAN: The point is this. Here are two bodies—practically public bodies—contending for a piece of land, each of them claiming it as necessary for its own purposes. Cannot you suggest any *via media* by which the essential objects of both shall be preserved, with great advantage to the public?

Witness: I have not given my attention to that point, and, therefore, my opinion will not be of much value; except the general answer I gave, that keeping a portion of the land would undoubtedly facilitate operations.

By the COMMITTEE: I think it would be more expensive to reconstruct the existing works than to make a new sewer upon the 24 acres.

Mr. *Thomas W. Keates*, examined by Mr. PHILBRICK.

I am consulting chemist to the Metropolitan Board. Questions of sewage come before me professionally very frequently. I have gone over the piece of land referred to, and examined the relation it bears to the works and the neighbourhood. As one of the advisers of the Board, I should say it is most inexpedient that they should part with it. I do not think they could advantageously enlarge their reservoir at any other spot. It is also possible the Board may be called upon to manipulate the sewage in some manner, and this is the only land belonging to them which they could use for the purpose.

Cross-examined by Mr. RICHARDS: I dare say the land would be very suitable for the gas company's purposes, but that does not affect the question so far as the Board are concerned.

Mr. *George W. Stevenson*, examined by Mr. PHILBRICK.

I am a civil engineer, and have devoted myself to questions of gas and water supply, and sewerage. I know the circumstances under which the promoters went to Beckton and built their works there, and I know the system under which they supply gas to the Metropolis from there. I know the site of the land in question.

Mr. PHILBRICK: Let me ask you how much of the 150 acres, which they bought in 1868, they have utilized at the present moment?

Serjeant SARGOOD objected that this point was not raised in the petition of the Metropolitan Board. They simply alleged that they wanted the land which the company had scheduled for their own purposes, and they must be confined to giving evidence upon that.

The CHAIRMAN ruled that it was desirable the examination should be confined to what was really the point at issue—viz., the balance of convenience to the two public bodies concerned.

Examination continued: Assuming the gas company require further land, there is not, in my judgment, any necessity for them to take these 24 acres. I am not prepared to say that it would not be a very convenient site for them to manufacture their residual products upon. There is no doubt it would; but, apart from convenience, there is no absolute necessity for them to have this land, especially as they can have land to the west of their present works suitable for their object. I consider these 24 acres essential to the Metropolitan Board in connexion with their drainage works. Their present storeage capacity is not sufficient, and the necessity for an increase is imminent. It was upon my advice the Board scheduled this land in their gas bill last year. The object of that bill was that the Board should erect works and supply gas to the Metropolis. It was a question involving a great many millions of money, and it was supposed that by it a considerable saving to the public would be effected. The object of scheduling this land, for gas purposes, was that the Board might have access to the river. The gas-works themselves, obviously, would not be built upon this little piece of 24 acres, but upon the great bulk of land which lies beyond—the 400 acres. There would have been merely a line of rails to the pier, or something of that kind on this piece, which would not have occupied any substantial portion of it.

Cross-examined by Mr. RICHARDS: River frontage is very important to the gas company, but they can have that elsewhere. The St. Katherine's Dock Company would have been prepared to give them a river frontage on the western side. Their petition was directed only to the question of nuisance arising from the proposal to manufacture residuals there. I was the engineer consulted by the Metropolitan Board last year about their gas bill. I selected the land on consultation with Sir J. W. Bazalgette. We contemplated using it for wharfage purposes; it was the only mode we had of getting to the river. We should not have interfered with the use of the land for the outfall, but have taken the coal and everything we wanted overhead on a level with our retort-house, as the company do, with the sewer discharging underneath.

Mr. RICHARDS: Did you mean to recommend last year that this should be the place for landing your coal, and that you would carry the coal over the outfall sewer, and over the reservoir?

Witness: I did contemplate another reservoir. I did not know the necessities of the Board, but I should never have intended to use that piece of land for other than wharfage purposes, and the transit of materials in and out. It is far too small to be of any use for the erection of retort-houses.

Mr. RICHARDS: When you mentioned the matter to Sir Joseph Bazalgette, did he not say, "Do not put a public wharf there, that is the very place we want for our reservoir"?

Witness: No; the public necessities keep growing.

By the CHAIRMAN: I do not think there would be any difficulty in constructing a fresh outfall, supposing a sufficient portion of this disputed territory

were reserved for the purpose of distributing the flow of sewage. If a third of the land were reserved, I dare say that would be sufficient; but I am not prepared to say that an additional reservoir upon the Board's land north of the existing reservoir would suffice for all time.

Mr. RICHARDS: What is the extent of the present outfall frontage? Twenty feet, is it not?

Witness: It is a great deal more than that; but I do not know exactly. The width of the actual opening through which the sewage flows appears from the plan to be about 100 feet.

Mr. CRIPPS suggested that, if questions as to the size of the sewers arose, it would be desirable to recall Sir J. Bazalgette.

The CHAIRMAN: I did ask questions bearing upon that very point. The questions I addressed to Sir J. Bazalgette were precisely of the same character, my object being to ascertain whether, supposing a certain quantity of this land, which I take to be rather less than a third of the whole, were reserved to the Metropolitan Board of Works, for the purpose of getting a fresh outfall in connexion with the new reservoir to be built north, above the ground proposed to be taken, that would not practically meet the circumstances. I understand Mr. Stevenson's evidence to be that there would be no serious difficulty in accomplishing that.

Mr. CRIPPS: I do not think Sir Joseph understood that to be the question.

The CHAIRMAN: I have drawn a line extending to 100 feet of frontage, and I consider that that might perhaps meet what the Metropolitan Board require.

Mr. CRIPPS: Does that pass under the outfall sewer?

The CHAIRMAN: Under the culvert. I understood Sir J. Bazalgette to say that it was a question of expense, as all engineering questions are.

Sir J. Bazalgette: I did not understand that it was to pass under the outfall sewer. I consider that that would be a most dangerous work. It would probably crack the sewer, and the consequences would be most disastrous. We have never had the sewer touched yet, and I am quite sure we should regard it as a most serious matter if it were interfered with.

Mr. John Burnett, surveyor to the Local Board of Woolwich, was called to prove that there was a right of way along the foreshore of the Thames through the Beckton works, and up to Barking Creek, and that it was extensively used as a footpath.

Mr. RICHARDS said the company totally denied the existence of any such right.

The CHAIRMAN intimated that it was not necessary to go further into the question of the right of way, it being irrelevant to the subject before the committee.

Mr. RICHARDS consented, on the suggestion of Mr. Philbrick, that a proviso should be inserted in the bill to the effect that the decision of the committee should not affect or alter the right of way, if any such existed.

Mr. PHILBRICK then addressed the committee on behalf of the Metropolitan Board. He said his clients were a corporation, and as such they had no power to acquire land except for the purposes for which Parliament credited them. They had not power to take land as private individuals, and all that they could take was taken under the condition of exercising compulsory powers, and giving compensation to those from whom they took it. They took it in the same way that railway companies took it, except that it was for a public purpose, and they taxed the public for the funds necessary for the purchase. But in the matter of the drainage of the Metropolis, they had power to carry a sewer underground anywhere, on condition of making proper payment for all damage done, and compensating the owner or occupier of the land disturbed by their operations. The duty of removing the sewage of the Metropolis was cast upon them; they were bound to intercept it, and conduct the whole of it to a point of discharge not higher up the Thames than Barking Creek, and it was a duty the performance of which could be enforced, if not by indictment, certainly by the Attorney-General on information. In the exercise of their official duties they constructed intercepting sewers, which converged at Barking, and there they purchased 77 acres of land, which constituted the site of their reservoir and outfall works. That land they obtained long before the gas company went to Beckton, and it seemed to him a strong proposition that a body like the Metropolitan Board, charged with an important public duty, a duty paramount to the supply of gas, should be called upon to part with land so acquired, because a gas company thought it would be convenient for their purposes. This was a trading company, established for the benefit of their own shareholders, and at the same time no doubt serving the public, whose interests, by the adoption of recent legislation, were in a direct ratio to those of the company. If the public convenience only was to be consulted, and the Metropolitan Board were seeking to acquire this land, instead of having had it for years, he would very confidently put it to the committee that the necessities and obligations of the Board were paramount, and if the parties were running a race before the committee as to who should have the land, he would respectfully urge that the claim of the Board was the one which ought to be considered, and ought to carry the day. But when, in the first place, the Board were found to be in possession of the land, that it had been acquired by them for the purpose of carrying out their public duties, and that, in the next place, all the gas company could say was that the site was very eligible for their own trading purposes, that the possession of it would give them more river frontage, and that at that spot they could more conveniently carry on the manufacture of residuals, the whole question resolved itself into this—a question of the price of gas, assuming that they could get any other land. Indeed, what they put forward in their evidence was that they could, owing to the facility of landing coal at Beckton, manufacture gas there at a less price, and therefore it was their policy to make the station at Beckton a great manufacturing station, from which to distribute gas to other stations, making them centres of distribution rather than points of manufacture, and they seemed to think that in the future their policy would be to carbonize as much coal and make as much gas at Beckton as possible, sending it through large mains to their other stations. Be it so, but he would ask if it stood alone there, was that such a paramount purpose as to justify the committee in giving them the preference when dealing between the parties before them. If it stood thus, as a mere matter of £ *s. d.*, he should think the committee, in their discretion, would not think it right to take from the Metropolitan Board this piece of land because it happened to be a convenient site for the company, when they had the evidence before them that it was equally desirable for the Board in the performance of their public duty. After referring to the evidence given by the promoters, the learned counsel said neither the governor of the company nor the engineer had said that the land was essential for their purpose; what they said was that it was very desirable and very convenient.

Mr. RICHARDS: They said they could not carry on their business without it.

Mr. PHILBRICK said if that was the effect of their evidence, he thought they had gone too far. He then referred to the evidence of the witnesses for the Board, who, he argued, had conclusively shown that the retention of the land was absolutely essential to their future requirements, for the extension of their reservoir and the discharge of the sewage. It was said on the side of the company that the Board had never utilized the land. The answer to that was very clear—viz., they never would have required to utilize it if the Essex Reclamation Company had made their conduit, and taken the sewage away far down to the sea, as proposed by them. It was also said that when the Board contemplated the erection of gas-works themselves, they scheduled this very land for the purpose. It was true they did include it in the lands to be devoted to that object; but it had been proved by Mr. Stevenson, who designed the works, that it never was intended to erect buildings there, but only to utilize it to facilitate the transit of materials. But he passed that by as a matter which he was glad to leave to be dealt with by the committee, who would see at once that when the Metropolitan Board embarked in a large undertaking for the supply of London with gas, the utilizing of this land for such a purpose was a very different thing from having it taken away from them altogether, and so depriving them of the power to use a yard of it for their main drainage operations. He submitted that the Metropolitan Board had made out their case, and that the company had failed to show, not that this land would be convenient to them, but that there existed a paramount necessity for taking it out of the hands of a public body who also required it for the completion of their drainage system.

The CHAIRMAN said there would be hardly time to hear Mr. Richards in reply that day, but the committee wished to suggest that, before they sat again, the parties should consider the expediency of agreeing to a compromise, with regard to the quantity of land to be taken. The committee were strongly of opinion that such a compromise was practicable, and that such a point as was indicated upon the map—viz., about 100 or 120 feet—reserved to the Metropolitan Board, to enable them to make arrangements for a new outfall, would meet their requirements; the other portion the committee thought it was desirable should be given to the gas company. The committee had simply to adjust the balance between two conveniences which happened to conflict, and they could only at the present moment make that suggestion, leaving it to the learned counsel to consider whether such a compromise would not avoid any further trouble.

Mr. RICHARDS: Do I understand you to mean that what you want the Board to retain is as much land as necessary to construct an additional outfall?

The CHAIRMAN: Yes, with such margin as may be required. I cannot say what it might be; but my impression is, about 100 feet would be ample. But it is not worth figuring about a few feet.

Mr. RICHARDS: I was going to say this, that although I do not propose to tender an answer now, I cannot help thinking that in the interest of both parties it would be extremely desirable if you were to give that as a distinct opinion rather than as a suggestion.

The CHAIRMAN: I am distinctly of opinion that that is the right course to be pursued.

Mr. RICHARDS: We will take this into our most respectful consideration; and I earnestly hope we may be able to present to you an arrangement that will be acceptable.

THURSDAY, MAY 18.

Mr. RICHARDS stated that the agents for the bill had written to the agents on the other side, inquiring whether they were prepared to act on the views expressed by the committee, and offering, if so, to meet and settle claims, but had received no reply.

Mr. PHILBRICK said that if the statement made by the chairman on the previous day was to be taken as the final decision of the committee, his clients, acting on the advice of their engineer, and having reference to their responsibilities in relation to the main drainage of the Metropolis, were not able to acquiesce in that decision, and would withdraw from taking any further part in the proceedings, in order that they might appear in another place at the proper time.

Counsel representing the Metropolitan Board having withdrawn,

The COMMITTEE passed the preamble of the bill.

Serjeant SARGOOD said, in view of the threatened opposition in another place, the promoters would retain the clause respecting the acquisition of land, in the form in which it stood in the bill.

The COMMITTEE assented, and the clauses of the bill having been read through, and, with amendments, agreed to,

The chairman was directed to report the bill to the House.

TUESDAY, MAY 16.

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY'S BILL.

Sir E. BECKETT, Q.C., Mr. VENABLES, Q.C., and Mr. RICHARDS, Q.C., appeared for the promoters; Mr. CRIPPS, Q.C., Mr. PHILBRICK, Q.C., and Mr. O'HARA for the Metropolitan Board of Works; Sir MORDAUNT WELLS, Q.C., for the Vestry of St. Giles, Camberwell; and Mr. MICHAEL for the Vestry of St. Mary, Lambeth, petitioners against the bill.

Sir E. BECKETT, in opening the case for the promoters, said he might describe the objects of the bill very shortly as being to increase the capital of the South Metropolitan Gas Company, to enable them to supply a greater quantity of gas over their district; to adopt, what he would call, for shortness, the Act of 1875, for although it was not at present an Act of Parliament, yet, as far as the Committee of this House were concerned, it was made an Act of Parliament last year. It was a bill that was sat upon by Mr. Forster, and put into the form which he thought fit to put it into, whatever the gas companies might have thought about it. He might state at the outset that the bill of the previous year, when passed by Mr. Forster's committee, was founded mainly, if not entirely, upon the evidence given by the South Metropolitan Company—that was to say, by their officers and manager—and if it had not been for the facts supplied by them, he thought even Mr. Forster, with all his desire to do what he did, would have found it rather difficult to proceed, because he would have had no materials to work upon if it had not been for the materials which the officers of the South Metropolitan Company gave him. Accordingly, the South Metropolitan Company this year adopted that which they were the principal means of enabling the public to obtain last year. The preamble of the bill was chiefly historical, and not worth dwelling upon. There was nothing until they came to the 4th clause, "Power to the company to raise additional money by creation of shares or stock." It would be proved by the manager that the demands upon the company required from £30,000 to £40,000 a year for the natural increase of their works. It was generally supposed that the capital granted to provincial companies would enable them to go on for about 20 years, but in London Parliament had not been in the habit of allowing the companies to go on so long as that; therefore, speaking roundly, he was about right in saying that the London companies were allowed to go on prospectively for about ten years. The capital now asked for would barely do that for the South Metropolitan Company, and if their district went on increasing fast, the demands would not be met by the capital the company now asked leave to raise; but there was no serious objection to that, and therefore he would not dwell upon it. They then had a clause respecting certain parts of the Act of 1869 which were inconsistent with Mr. Forster's Bill of last year; and, as the company were adopting that Bill, they must repeal all those clauses in the previous Act which were inconsistent with it. Then they arrived at another consequence of the Bill of last year—viz., a certain "description of burner for testing the illuminating power." The question was gone into at great length last year, and a sort of standard burner had been fixed upon, which they were now adopting. It had been altered to some extent since 1869, and therefore it was necessary that they should conform to the last principles adopted by Parliament about burners. There was some alteration in the mode of testing for purity since the last Act, and discussions were at the present time going on with some of the companies about testing for sulphur, but he did not know that any definite conclusions had been arrived at. Passing from that, they came to "forfeiture for defect of power," which was in the nature of a penalty. Then, "illuminating power," that, again, was fixed in conformity with the legislation of last year. Under the companies Act of 1869, the illuminating power was to be 14 candles, but now it was to be 16 candles, according to what was enacted last year by Mr. Forster's committee with regard to the companies in general. Then there came a clause of some importance, and he supposed it was the one

on which there would be most discussion, as to what was commonly called the sliding-scale clause. That was a pure invention of the Board of Trade last year, and was adopted by Mr. Forster. The other companies contended strongly against it, but the South Metropolitan Company, on this point more especially, supported the Board of Trade and Mr. Forster; and therefore it was natural that they should come now, and be willing to adopt it themselves. It was thought by the other companies to be extremely oppressive, and they resisted it; but the South Metropolitan said that if those other companies managed their business as well as they did it would be no hardship upon them. There was a great deal of discussion upon the initial price, but in the end it was fixed by Mr. Forster's committee at 3s. 9d. per 1000 feet, subject to increase or decrease, according to the increase or decrease of dividend, and he believed the Metropolitan Board of Works did not ask for any alteration in the clause, and could not reasonably do so. There were, however, two or three vestries who thought they were entitled to act for themselves, and who asked for some special legislation, contrary to that which was adopted last year. He knew he could not preclude those vestries from being heard, but he thought the committee would come to the conclusion that if that great body, which represented nearly everybody in the Metropolis, was contented with the general bill as it was under the legislation of last year, it was totally unreasonable that one or two insignificant vestries should start up and try to get for themselves that which other people said by their representations they did not want. In 1860 the Metropolitan Vestries brought a general bill into Parliament to restrain the gas companies from doing a great many things which they had power to do under their own special Acts, and with some modifications that bill was adopted by the Metropolitan Board of Works, and passed the House of Commons; but there were some insignificant vestries who thought they could carry the bill a little further, and they got up an opposition in the House of Lords, but they were easily disposed of, simply by saying what he (Sir E. Beckett) said now: "You were practically represented by the Metropolitan Board of Works, and with that Board matters have been arranged, and the committee surely would not allow one constituent of the Metropolitan Board to repudiate or reopen that arrangement." Of course, the House of Lords would not do so. Then, in 1866, the Metropolitan Board, urged on by people calling themselves the public—that was half-a-dozen gas agitators, who could not get out of the Act of 1860 quite so much from the gas companies as they wanted—thought they would try again, and they brought in a bill, which was referred to a very large committee, and the case was heard on the part of the City of London at great length. They called sundry witnesses in support of their bill, and the gas companies had only one witness against the bill, because at the end of that evidence the chairman, Sir John Trollope, struck in, and said, "As some proposal has been made to us in the names of the gas companies, we will not trouble you any more, and you may leave the case in our hands." The counsel, who happened to be present at the time, took that suggestion, and did leave it in their hands; but Sir John Trollope, reckoned without his host—as people were apt to do in those big committees—and the result was that, instead of resolutions expressing contentment with the gas company's offer, there were a set of resolutions of the most hostile and unfavourable nature; and no wonder, because they were given before the committee heard the evidence for the companies. Of course, those resolutions were not submitted to, but they did the companies a great deal of harm, because it gave something to talk about, and the gas agitators, in the following year, were able to say the people outside did not like the way in which the gas companies were dealing. The learned counsel continued to give the history of subsequent gas legislation (during which he read several extracts from the proceedings before the various committees) down to the amalgamation of the Chartered and Imperial Companies, when he was interrupted by

The CHAIRMAN, who said the committee had had that before them a few days previously, and had heard those facts before.

Sir E. BECKETT said he only mentioned these subjects to show that the gas companies always—as far as they could without confiscating their privileges—yielded to the claims, and even to the suggestions of Parliament. In 1868 Mr. Cardwell had no one who put him up to the revision clauses and machinery which was then imposed upon the gas companies. In that year it was said that the price of coals might rise, but everybody laughed at the idea. It was said, on the other hand, that it might fall, and it might be necessary to have some means of revising the price of gas, and accordingly Mr. Cardwell introduced the Revision Commissioners. In 1868 the idea of there being a rise in the price of coal was ridiculed, but it was perfectly well known what had since happened. In 1873 several of the companies if they had not had reserve-funds, would have been actually without any dividends at all, and many of them had to draw very largely upon those reserve-funds. There had always been a struggle on the part of the Metropolitan Board—and to a great extent on the part of the Board of Trade—against allowing the companies to form reserve-funds. In 1873 the companies, under the pressure put upon them by the enhanced price of coal, applied to the Revision Commissioners for a revision. The matter was fought out at great length, and the result was in favour of the companies. The revision clauses did not turn out to do for the Metropolitan Board and the consumers all they expected. They thought that as they invented them they would turn out entirely in their favour; but all that came from them was a great outcry and agitation. After some further remarks, with reference to the Imperial Company, Sir E. Beckett said that the South Metropolitan Company, by reason, as Mr. Forster said last year, of their good management, and perhaps also of their good luck—because they had the good luck at an early period of their existence to obtain land very cheap on which they carried on their works—had always been able to supply gas at a much lower rate than other companies in the Metropolis; at any rate for a long time. Accordingly they could well afford to accept the terms which Mr. Cardwell imposed upon the Chartered, the City of London, and the Great Central, in 1868, and they went before Parliament in 1869 for more capital, which they wanted, and the committee at once gave them 10 per cent., just as Mr. Cardwell had given it to the other companies in 1868. The South Metropolitan Company were now in the same position; they came before the committee accepting the legislation of 1875, which was directed against all the companies. They said: "We accept the whole of it, and why are we not to be allowed to raise our new capital at 10 per cent? The argument was precisely the same as it was in 1869, and he (Sir E. Beckett) defied any human being to make out any difference. He knew the companies in the country generally were not allowed to raise new capital at more than 7 per cent., but then those companies were not under sliding scales, and dodges of that kind. There was one other thing he should mention, and that was the power of amalgamation introduced into the present bill, for the purpose of carrying out Mr. Cardwell's principle as far as it reasonably could be done. There remained on the south side of London three companies, strictly speaking, which were not amalgamated—because the London Company had a district both north and south—and powers were sought by the bill to amalgamate those three companies. The committee might possibly think it worth while to distinguish between the London Company and the other companies in some way; but, leaving out that company for convenience, it was proposed to amalgamate the other three, whose united capitals only amounted to 2½ millions, while the capitals already amalgamated on the north side of the river amounted to 8½ millions. It was assumed that Mr. Cardwell contemplated an amalgamation much larger than 2½ millions, because he contemplated almost without limit. Parliament had not imposed any limit, because, as far as he could remember, Parliament had never rejected a single amalgamation bill of any definite companies. He asked, was it or was it not better that the companies upon the south side of London should be encouraged to amalgamate?

Sir M. WILLS said that in 1872 there was an application to amalgamate the South Metropolitan and the Phœnix, and it was rejected by the committee.

Sir E. BECKETT said he had forgotten that, but he was told the statement was not right after all—the Phœnix Company withdrew the bill.

Sir M. WILLS said that after the opposition had been heard, such an intimation was given by the committee as induced the promoters of the bill to withdraw it.

Sir E. BECKETT said it appeared that he was right when he said that no bill for definite amalgamation had been rejected. The present bill was not simply for an amalgamation with the Phœnix, but an amalgamation carrying out the principle which had been carried out enormously on the north side of London. The alternative of that was encouraging the Chartered Company to go on, and gradually to swallow up the companies on the south side also. Then there was one more thing asked for, which went by the name of the auction clauses. That was referred to in the petition of the Metropolitan Board. He answered that by saying there were no auction clauses in the Acts of 1868, 1869, or 1875. Their origin was in the case of the Nottingham Gas Company, many years ago, but that was a pure matter of arrangement for reasons of policy between the company and the corporation. But that company had been before Parliament several times since, and the corporation had tried to obtain the application of the auction clauses to the additional capital to be raised, and they had failed. In the case of the Sunderland Company, it had also been successfully resisted; and he (Sir E. Beckett) was quite certain there had been no application of an auction clause hostile to any gas or water company within the last ten years. He was, however, obliged to say over again that Parliament had thought fit, for some reason or other, to deal with the London gas companies exceptionally, oppressing them, as the companies thought, in one direction, but comforting them for that oppression by allowing them to pay 10 per cent., if they could earn it fairly, subject to all the restrictions placed upon it. When they came to selling capital by auction, of course that meant that the shareholders were not to get the benefit of it. What did the Companies Clauses Act say? Why, that all the companies, when their shares were at a premium, should have the right of distributing their shares among their shareholders. All his clients asked the committee was to give them their new capital on the same terms as were imposed on the companies in 1868-9, subject to the same liabilities as to sliding-scale, reserve-fund, illuminating power, and everything else, as were imposed upon the companies generally last year. He was told that the Imperial and the Chartered Companies had accepted these clauses. All he could say upon that was, if they liked to make that bargain it was their own business; but it was an exception from general legislation. He respectfully declined the auction clauses, and he was only there to submit to the general legislation of last year.

Mr. CRIPPS said it might be desirable, on the part of the Metropolitan Board of Works, after Sir E. Beckett's statement, that the committee should understand exactly what the issues were between the Board and the South Metropolitan Gas Company. The Board did not raise any question or difficulty on the question of the initial price, about which a good deal had been said. Their objection was to the power given to this particular company to amalgamate.

The CHAIRMAN: Is it proposed to amalgamate all the companies in the south?

Mr. CRIPPS said it was not. The bill proposed to take power to amalgamate with any of the companies south of the Thames. That part of the bill the Board objected to, and also to the omission of the auction clauses.

Sir M. WELLS said he opposed on behalf of the consumers on the same ground as the Metropolitan Board of Works; but, in addition to that, he and Mr. Michael, on behalf of two bodies of consumers, opposed the bill on the ground of the initial price proposed being 3s. 9d., the charge to the consumer being only 3s.

After some conversation,

Mr. RICHARDS asked what position he was in. The Metropolitan Board having dropped the question—having conceded the price of 3s. 9d.—were the vestries represented by the Metropolitan Board of Works to be allowed to raise the question of initial price? He contended that Sir M. Wells had no right to be heard against the Metropolitan Board if that Board had abandoned their position.

Sir M. WELLS said his *locus standi* had not been disputed, and it was the province of the committee to hear him upon the allegations contained in his petition.

The CHAIRMAN said the committee could not exclude Sir M. Wells from taking the objection when the time arrived.

Mr. *George Thomas Livesey*, examined by Mr. RICHARDS.

I am a member of the Institution of Civil Engineers, and have been President of the British Association of Gas Managers. My father managed the South Metropolitan Gas Company from 1839 till his death in 1871, and I have been in the service of the company for upwards of 25 years. Previous to 1871 I was, for some years, their engineer, and since that time have been both secretary and engineer. The company first sold gas in 1833, having been started to supply cannel gas in opposition to the Phœnix, who were the only company in south London then. The South Metropolitan Company were brought almost to the brink of ruin in the first five years of their existence, as in 1839 their capital amounted to £88,000, but I do not think the plant was worth £10,000. In 1842 we obtained our first Act of Parliament. During the first ten years of the company's existence the dividend was 2½ per cent., and in the next ten years the average dividend was 6 per cent. The difference between that and the 10 per cent. which we were entitled to divide was devoted to restoring and renewing the capital which had been previously lost, so that the shareholders themselves gave up that to which they were fully entitled in order to recover the lost capital. The public suffered no detriment; it came out of the pockets of the shareholders entirely. For some short time after that, even when we had replaced the capital, we continued the system to some extent. In point of fact we had fully as much plant as was represented by the capital. The result was that whereas in 1839 I calculate that the capital per 1000 feet of gas sold was something like £2 10s., in 1850 it had been reduced to 15s., and it is now only 10s. 6d. The following table shows the capital, dividend, coals used, and price of gas from the starting of the company to the end of last year:—

SOUTH METROPOLITAN GASLIGHT AND COKE COMPANY
(for the Supply of Cannel Gas).
Statement of Capital, Dividend, Coals Used, and Price of Gas from the Starting of the Company.
Gas First Made in 1833.—*First Dividend Paid in* 1836.

Date.	Dividend.	Capital Paid Up.	Coals Used.	Price of Gas.
		£	Tons.	
1833	..	20,893	No record.	Gas first sold chiefly by contract; 11s. for cannel gas by meter in 1833, reduced in the course of the first five or six years to 9s. for common gas.
1834	..	44,666	"	
1835	..	68,075	"	
1836	1½ per cent.	76,000	"	
1837	2½ "	82,000	"	
1838	2½ "	88,000	4,400*	
1839	4 "	88,000	5,000*	..
1840	4 "	88,000	5,600*	..
1841	5 "	94,000	6,300*	..
1842	5 "	94,000	7,000*	..
1843	6 "	100,000	7,744†	9s., and meter-rent; 8s., July 1, 1843.

Average rate for first ten years, 2½ per cent.; for second ten years, 6 per cent.

* Estimated. † First record of coals used.

Date.	Dividend.	Capital Paid Up.	Coals Used.	Price of Gas.
		£	Tons.	
1844	6 per cent.	100,000	9,125	..
1845	6 „	100,000	10,049	..
1846	6 „ and bonus of 4 per cent.	100,000	10,731	..
1847	6 „	100,000	11,983	..
1848	6 „	100,000	12,193	7s., Jan. 1, 1848; 6s., July 1, 1848.
1849	6 „ and bonus of 4 per cent.	100,000	14,159	..
1850	6 „	100,000	17,021	5s., July 1, 1850.
1851	6 „	100,000	20,576	4s., Oct. 1, 1851. No meter-rent from this time.
1852	6 „	100,000	22,634	..
1853	6 „	100,000	23 888	Districts divided, Oct. 1, 1853.
1854	6 „	100,000	27,094	4s. 6d., Jan. 1, 1854.
1855	6 „ and bonus of 1 per cent.	100,000	26,148	..
1856	6 „ and bonus of 1 per cent.	116,000	25,795	..
1857	6 „ and bonus of 1 per cent.	120,000	28,347	..
1858	6 „ and bonus of 3 per cent.	152,000	28,574	..
1859	6 „ and bonus of 3 per cent.	152,000	30,393	..
1860	6 „ and bonus of 3 per cent.	152,000	31,683	4s. 2d., Oct. 1, 1860.
1861	10 „	163,525	32,248	..
1862	10 „	195,883	35,874	4s., Jan. 1, 1862.
1863	10 „	200,000	37,905	The extra 6d. per 1000 in country district abolished, Jan. 1, 1863.
1864	10 „	200,000	41,931	3s. 8d., July 1, 1864.
1865	10 „	200,000	47,820	3s. 4d., July 1, 1865.
1866	10 „	228,821	48,484	..
1867	10 „	249,267	53,056	..
1868	10 „	250,000	54,513	..
1869	10 „	270,000	57,859	3s. 2d., Oct. 1, 1869.
1870	10 „	300,000	60,924	..
1871	10 „	300,000	67,353	..
1872	10 „	320,000	70,489	3s., Jan. 1, 1872.
1873	10 „	348,975	76,312	..
1874	10 „	384,751	83,766	..
1875	10 „	430,000	90,843	..

Our price from the 1st of January, 1872, up to the present time has been 3s per 1000 for 14-candle gas. Under our Act of 1869 the revision clauses, which first appeared in the City of London Gas Act, 1868, were applied to us, for the purpose of securing us 10 per cent. dividend, "with due care and management." The Chartered and Imperial Companies both availed themselves of these clauses, but we never did, so that, notwithstanding the great price of coal during 1871, 1872, and 1873, we contrived to pay our dividend without ever increasing our price. This we were enabled to do through having at the beginning of 1872 a fund, amounting to £17,000, of undivided profit, which enabled us to pay our dividends to some extent during that year, and gave us 2d. per 1000 feet during the next two or three years. We also made a different arrangement for the purchase of coal. Instead of adopting the usual plan of making contracts for twelve months, we in the beginning of 1873, as it happened to be the time when the highest price of coal was reached, altered our system, and only bought 20,000 tons at the top price. We gave 20s. a ton for that coal, and when that was used made another contract for three months, and another, and another, so that by the end of the year we were buying coals for 15s. a ton, which, if we had made the full contract, we should have had to pay 20s. for. This alteration in the system of buying coals made a difference to us of 4d. per 1000 feet in the price of gas. Had we gone on in the old way, we should have had to charge 4d. per 1000 more to meet the extra cost of coal. Coke fetched a much higher price in the years of the coal famine, and that helped us to meet the increased cost of coal to some extent. Tar also brought a higher price, and we deferred the repairs and renewals of works as far as possible. In the year 1873 it cost us 2d. per 1000 feet for repairs of works, and in the year 1874 1½d. per 1000, but in the year 1875, when things became easier, it cost us 4d. per 1000, which is perhaps about the normal rate, so that we saved 4d. for coal, 2d. through putting off renewals, and 2d. we took out of this surplus fund, making a difference of 8d. per 1000. Had we not adopted those expedients our price would have been 3s. 8d. instead of 3s. Last year a bill to amend the Metropolis Gas Act of 1860 was introduced, and my company were put forward as the model company. I was called as a witness in favour of the bill, and it was said generally that it was mainly through my evidence that the committee arrived at the conclusion that 3s. 9d. was a proper maximum price to insert in the bill. At the conclusion of the case, an application was made to the committee that an exception should be made against my company, and that we should only be allowed, say, a 3s 3d. maximum, but that was decidedly rejected. The chairman, Mr. Forster, said, "Our opinion of what is fair to the South Metropolitan Company is that they should not suffer because they have set the example of economy and good management." That bill having been passed by the committee, never got any farther, but was dropped. Since that time, the Chartered, the Imperial, and the Independent Companies have amalgamated under a scheme approved by the Board of Trade, and have accepted this year the clauses contained in the bill which they refused last year, and, in addition, have submitted to what are called the auction clauses. It is upon that agreement that this committee acted, a day or two ago, in passing The Gaslight and Coke Company's Bill. Our present bill is for powers to raise additional capital, to adopt the main provisions of the bill passed last year, and to amalgamate with other companies. Our capital under the Act of 1864 was £250,000, and by the Act of 1869 we got an additional £250,000, and £62,500 borrowing powers. Of that capital, £430,000 have been called up and expended, so that there remains a balance of £70,000, of which £30,000 or £40,000 will be called up within the next two or three months, and the rest next year. We should have had to come for capital, if for nothing else, within a year or two, anyhow, and as we were coming for other things, we thought it better to put the whole in. We ask for £250,000 capital, and £187,500 borrowing powers, making a total of £750,000 and £250,000 respectively. We have a very wide district, the extreme boundary of it abutting on Croydon, and a large portion of it being unoccupied by houses. By calculations and comparisons which I have made during the last few years, I think our increase of business has been in greater proportion than that of any other London company. Houses are being very rapidly built all over the district, but at present it is more expensive to supply than the crowded parts of town, so that the committee ought to give us a higher rather than a lower initial price.

By the COMMITTEE: Our works are on the Surrey Canal, in the Old Kent Road. The parish of Camberwell, which we supply almost entirely, is extending very rapidly; but the houses that are built are nearly all small, letting at from £25 to £40 a year. We have to lay mains in the new streets, and very often get nothing but the public lamps to supply.

Examination resumed: The Act of 1860 compels us to lay mains to supply public lamps on one condition only—viz., that the lamps are at a distance not exceeding 75 yards from an existing main; and then for private consumers, however small, we must lay, if they are within 50 yards; so that we have really no option whatever as to expenditure of capital for main and distribution purposes. Under these circumstances the capital we ask for is not unreasonable. We shall use it all up in less than 15 years—I reckon in about 12 years. The sliding scale, which I myself suggested in 1872 at the meeting of the British Association of Gas Managers, is a device which gives the consumers and the company a mutual interest in the price charged for gas, and that system we propose to adopt now in the case of the South Metropolitan Company. Again, we propose to amalgamate with other companies; but the power is to be limited to those who are south of the Thames. I am aware that The Gaslight and Coke Company have power to amalgamate with any metropolitan company; therefore, at the present moment, by obtaining the sanction of the Board of Trade, they could absorb us just as they did lately the Imperial and Independent Companies. I was present lately at an interview with Mr. Farrer, at the Board of Trade, with reference to the companies south of the Thames.

Mr. RICHARDS: Do you know whether an agreement has been made by which these companies are to have power, or are about to take power, to amalgamate further?

Mr. CRIPPS objected to the question, on the ground that if anything had been done on the part of the Board of Trade, it would have been done by an official document, which should be produced.

Examination continued: What we are asking for power to do, with reference to the companies south of the Thames, is exactly what the Chartered have already got power to do with every company in the Metropolis—nothing more. Amalgamation was one of the things recommended in Mr. Cardwell's report of 1867, and it has been pressed upon the companies at every opportunity by the Board of Trade as essential to the good supply of gas to London. The Board were parties to the bill by which the amalgamations of the Chartered with the City of London and Great Central Companies were effected. Since that time the Victoria Docks Works and the Equitable and Western Companies, in addition to the two companies this year, have been absorbed by the Chartered. Last year the Commercial and Ratcliff Companies amalgamated, with the authority of Parliament. Their bill was not opposed by the Metropolitan Board of Works with reference to the amalgamation. In that case the new capital was to be raised at 7 per cent. in the ordinary way, with this limitation, that when £70,000 had been issued they should borrow £70,000 before they could raise further capital from their shareholders. Auction clauses were never applied in the case of a metropolitan company till the recent arrangement, though they were suggested, I believe, last year. The Chartered Company have now accepted the auction clauses.

Mr. RICHARDS: Do you know what the alternative proposition of the Board of Trade was which induced the company to accept them? Do you know that the Board of Trade suggested that all new capital should be raised by debentures, by borrowing?

Witness: I thought that was the suggestion of the Chartered Company themselves.

Examination concluded: In our present bill there are what may be called some domestic arrangements to settle—as to the scale of voting, and so on. Our Act of 1842 provided for £50 shares, while £12 10s. shares were created under the 1869 Act. The former Act says five shares shall have a vote, and we want to know whether it is five £50, or five £12 10s. shares. The question has been raised by different shareholders, and it is quite possible we might have a lawsuit to decide it, if it is not put right by an Act. The question as to the qualification of the directors is in a similar condition. There is also some arrangement required as to proxies, as we do not really know how we stand as to the votes of shareholders, and we want to put the question upon a definite basis.

By the COMMITTEE: Our present maximum quality is 14 candles, which we propose to raise to 16. The additional cost has been stated at 2½d. per candle, but I said last year I thought 1½d would do, which would make 3d. difference.

Cross-examined by Mr. CRIPPS: The bone of contention in last year's inquiry was the sliding scale, which was a new principle for the first time introduced into the question of the supply of gas, as up to that time no company could divide more than 10 per cent. under any circumstances, whereas the sliding scale gave them the opportunity, by dint of economy and good management, to divide more than that amount, if they could. I believe that arrangement was certainly as fair a thing for the companies as for the consumers.

Mr. CRIPPS: Taking it in a general way, all profit which can be made by a company beyond 10 per cent. goes, we will say roughly, half to the company and half to the consumers?

Witness: In our case three parts go to the consumers and one part to the company, because of our small capital. Where there is a heavy capital it is half and half.

Mr. CRIPPS: Now for the auction clauses. Before last year, when the companies could only divide 10 per cent., if more capital were required they could appropriate the whole of the benefit to themselves, as, supposing their shares to be, as you know they were generally, at about 100 per cent. premium, if new capital were allotted with the 10 per cent. dividend, there was a bonus to the shareholders of 100 per cent.?

Witness: It amounts to that by the time the shares are all called up.

Mr. CRIPPS: But then it was a loss to the general funds of the company, because they had to pay that high sum for new capital, which they could have got at 5 per cent?

Witness: I cannot say it was a loss to the company. Parliament sanctioned the 10 per cent. dividend.

Mr. CRIPPS: Therefore they, as a company, raised money from their shareholders at the extravagant rate of 10 per cent., whereas they could have raised it in the open market at 5 per cent.?

Witness: They could raise it readily by shares at 7 per cent., and by loans or debentures at 5 per cent.

Mr. CRIPPS: When once, under the old system, the shareholders had the benefit of the bonus in the first instance, the company, as a company, were the losers after that, inasmuch as they had raised money at a high rate?

Witness: I cannot dispute that. The company might have raised the capital at a lower rate, and have been able to supply their gas cheaper.

Mr. CRIPPS: And the cheaper any company can raise capital the larger will be the profit upon the whole capital they are dealing with, because one of the first things a company have to look to is to pay interest upon capital.

Witness: Yes, but the old system limited the profit absolutely.

Mr. CRIPPS: But, inasmuch as you are going beyond 10 per cent., the profit arising from the new capital is divided between the consumers and the shareholders by the auction claims?

Witness: They are in that sense an indirect benefit to the shareholders, but whether it is equal to the benefit of the premiums is another matter. There is no doubt that, under the auction clauses, if we sell £100,000 of capital we shall get £200,000, which will be the same as raising money at 5 per cent., and would enable us possibly to reduce our price for gas to some slight extent, and so increase our dividends.

Cross-examination resumed: The introduction of the sliding scale alters the question of auction clauses, certainly. The Chartered Company have accepted these clauses, but they are in a different position to my company. They have a very large capital, and, besides that, Mr. Field, their accountant, stated last

year he considered they had £700,000 worth of worn-out capital, which the auction clauses will enable them to recover. We have no worn-out capital. With respect to the amalgamation which was proposed in 1872, between my company and the Phœnix, the argument on behalf of the Metropolitan Board, who opposed, was that it would be an unfair thing to the consumers of our particular district, who had for long enjoyed the benefit of a low price, and were looking for a still further reduction, that we should amalgamate with a company charging a higher price. That bill was withdrawn by the promoters after the opposition was gone into. I always felt it was mismanaged, and promoted in a very half-hearted manner. The Phœnix Company were divided upon the question. I consider that a general amalgamation of the southern companies would make a very compact company, and would in a short time tend greatly to the benefit not only of Camberwell, but of all consumers, and I may say one word further upon this ground. The Phœnix have three river-side works, the London have one, and the Surrey Consumers also have one, admirably situated for the manufacture of gas, but with no room for extension and no ground for storeage and gasholders. On the other hand, our works are on the Surrey Canal, two miles from the river, but we have half a mile of water frontage, and between 30 and 40 acres of freehold land, which would make it an admirable storeage station for the whole of the south of London. I believe we could so work the different stations of the four companies, that in the result there would be much greater economy effected in the south than there has been in the north of London. Up to the present time the amalgamations on the north of the Thames have not been productive of the economy expected of them, as they have had to abolish several works which could not be retained in their present situations; but we should utilize all the works in the south. We have £70,000 of unexpended capital, but this will be reduced to £40,000 by the end of this year. Besides that, we have £62,500 of unexercised borrowing powers. Our district is not a quarter filled up, and, looking to the future, I think the £250,000 we ask for will take us on for about ten years, after we have expended what we have now remaining. Under the sliding scale I do not see that it matters whether we have more or less capital.

By Sir M. WELLS: In 1872, when it was proposed that we should amalgamate, we were to be guaranteed our full dividends, and it was admitted then that that would have the effect of increasing the value of our shares 25 per cent., but we have now the fact that the capital which the Chartered Company guaranteed the Great Central is at present only about 15 per cent. better than the ordinary capital. Supposing our capital to be enhanced in value to that extent, of course, it could not, in any possible way, be beneficial to the consumers; but that is not the question now. Our present maximum dividend is 10 per cent., but in the event of there being an increase, say, to 12 per cent., that will be beneficial to the consumer, because we should get that increase by economy of working, and should try to reduce our price still further, in order to get a higher dividend. We are now charging 3s., our maximum being 3s. 6d., and we propose to take a higher initial price, 3s. 9d., and, at the same time, give an equivalent in the two candles better gas, which is about a fair thing.

Sir M. WELLS: In your evidence, given last year before Mr. Forster's committee, you said that the illuminating power of your gas had been a trifle in excess of 16 candles, so that if the consumer now has that quality of gas at a cost of 3s., where is the advantage and the benefit if you are to have an initial price of 3s. 9d.? You say the advantage is giving additional illuminating power, but you give it already, do you not?

Witness: If our minimum is fixed at 16 candles, we shall have to give over 17, in order to be safe, as we are subject to penalties if we are below our minimum. When fixed at 14 we always tried to give 15½-candle gas, this extra being a free gift to the consumers, who will now have another candle and a half extra, equivalent to about 2½d. The benefit of the sliding scale to the consumers is this, that it gives us a direct inducement to sell gas as cheaply as possible. If the clause is passed by the committee giving us the power of amalgamation, which was refused in 1872, we should be able to do it without a Parliamentary inquiry, by applying to the Board of Trade, who would hear all the objections the Metropolitan Board might have to urge, though they would not have the advantage, if advantage it be, of being represented by counsel. With reference to capital, the whole of ours bears 10 per cent. dividend, but that is no more than a number of other companies had upon their second applications. The Imperial, some time between 1850 and 1860, doubled their capital, and got 10 per cent. upon the new, but in 1866 they were limited to 7 per cent. Our maximum being now 3s. 6d., the lowering of our price depends to some extent on the state of our reserve-fund. Under the old system we can only have a certain amount of reserve-fund, and if we have made every possible change we can, by way of expenditure, then the public are entitled to a reduction.

By the COMMITTEE: Our reserve, as fixed by our original Act, and limited by the Act of 1869, is £20,000.

Sir M. WELLS: What would it be in the case of the additional capital now applied for?

Witness: Under the sliding scale system we are allowed to accumulate any amount of reserve-fund we please. Supposing we are selling gas at 3s., and so are entitled to 12½ per cent. dividend, we can divide the whole among our shareholders, or appropriate say 2½ per cent. of it to the reserve-fund. Undoubtedly the latter would be a wise course to adopt, so as to accumulate a large reserve, to enable us to tide over the periods of difficulty which are likely to recur.

Sir M. WELLS: That may be so; but I am representing the consumers, and not taking a shareholders view. I represent the public, as it were, and ask you this: Can you suggest, supposing the reserve-fund could go on and be worked as it has been for some years, whether it is then more than probable there will be a further reduction in the Camberwell district, so that instead of being 3s. the price for gas may be 2s. 10d.?

Witness: It is very improbable. If the Camberwell district serve us as they are trying to do now, I am sure I shall not try to serve them so well any more.

Sir M. WELLS: I have your evidence where you yourself have suggested that there was a probability of a still greater reduction.

Witness: There may be; but it would be very foolish of us to go on reducing the price if it is to be made use of as a lever to force us into a worse condition.

Sir M. WELLS: The result of your examination before Mr. Forster's committee was this, that while on the one hand you said some things rather against other companies, you took care of your own company by suggesting a charge of 3s. 9d., your charge being 3s.

Witness: Not specially for my own company. I said that I considered 3s. 9d. a fair price. I said I believed that the Metropolitan Board were applying the 3s. 9d. initial price as the soundest for the consumers, and surely if that is fair for one part of London it is for another.

By Mr. MICHAEL: The circumstances which determine the price of gas in any one district of the Metropolis are, the interest to be paid on capital, the price of coal, and the receipts from residuals; there is not much difference in the management now. I would say that the consumers certainly are not entitled to any benefit that may result from great economy and care in the expenditure of capital, any more than they are responsible for the loss resulting from a waste of capital. Still, I think we are bound to exercise the greatest possible economy in the expenditure of capital upon works; but I consider we have done more than our duty in foregoing the capital that was lost or expended out of profits in the early years of the company. Most companies apply for power to capitalize their profits; the Independent and the Phœnix did so, but we gave it up altogether, and that is one reason why our capital is so small, the shareholders having given up advantages to which they were legally entitled.

Mr. MICHAEL: Having adopted a certain line of conduct, and treated your capital in a certain way, are you now to turn round and penalize the consumer, and say that the time has come when "we should be paid something extra for what we did on your behalf"?

Witness: I am not penalizing the consumer at all, I am only asking him to pay what was considered fair for all London by Mr. Forster's committee and the Metropolitan Board.

Mr. MICHAEL: I have nothing to do with Mr. Forster's committee and the Metropolitan Board. I am here for the consumers.

Cross-examination resumed: The moment this bill passes we may probably charge 3s. 3d. per 1000 for gas, and, if we can earn it, pay 11¼ per cent. The circumstances under which we shall then produce gas will be altered only in this way, that we shall have a direct pecuniary interest in economy in every way, and in commercial matters the direct pecuniary interest is the only interest you can appeal to. Under the new *régime* we shall, by selling at 3s. 3d., have the power to pay 11½ per cent., but it does not follow that we shall earn it.

Mr. MICHAEL: Then I ask, what circumstances will prevent you producing gas at such a price as to supply 16-candle quality for 3s. 3d., after the passing of this bill, which did not exist before?

Witness: I can tell you one thing. There is a very large district open to us, and we have to provide for a certain increase of business annually, which entails a certain amount of expenditure. There are new works to be erected and new mains to be laid, and everything of that kind. My practice has been, all the time of my management, to take the business that comes to me, and not trouble to push it at all. If I have a direct pecuniary inducement to increase my business I shall try and push it on in every way possible.

Mr. MICHAEL: Forgive me. What does that involve; that you are going to push the business, to my injury, into new districts, which will not be so profitable, and make me pay the increased price for the extension of the business?

Witness: Not a bit of it; I shall push the business so as to sell my gas, and reduce the price.

Cross-examination continued: Capital, when raised in the way it is proposed, by auction sales, involves a certain premium which, instead of earning dividend, is put into the capital of the company. Our shares fetch, at the present time, 100 per cent. premium, and rather more, so that if the new shares sold at that price, the amount to be paid by the general consumer would be reduced to 5 per cent. on the average, but it would give us the benefit of an additional security to earn our dividend over the whole capital. I am not prepared to say that we shall make gas at a cheaper rate this year than the companies surrounding us. The others are nearly all on a level. It was said last year that we had gained an advantage in the sale of coke, but the tables we have here show that on that score we are no better off than our neighbours in any way. The amount required to pay interest on capital, however, is in our case a trifle under 1s. per 1000 feet, while it ranges in the others at about 1s. 6d. or 1s. 7d. per 1000 feet. There is a difference between us and the Phœnix of about 4d. If we amalgamated with them, and if, in order to introduce an equality of price, ours was put up, I admit it would be an unfair thing to our consumers thus to make them suffer, but I can only say, as far as my company are concerned, we do not propose to be parties to such an arrangement.

Mr. MICHAEL: How can we, as consumers, prevent such a thing being done? The company can go to the Board of Trade when circumstances require it. I shall not be heard there as representing the consumers, because it is all done by the Board without *viva voce* evidence, and behind my back this price of 2d. or 4d. may be put on without my being able to say anything against it.

Witness: The Board of Trade would look at the question broadly, and so this will be a benefit to the whole of south London, as they would fix the price.

Mr. MICHAEL: Has not the result of amalgamation up to the present time been that certain of the companies who have amalgamated have charged, some more, some less, but those charging less have been absorbed into those charging more and the "more" has prevailed as the charge.

Witness: Yes, I have always said that.

Re-examined by Mr. RICHARDS: The bill introduced by the Phœnix Company in 1872 for the purpose of amalgamation with the South Metropolitan Company proposed to effect that amalgamation absolutely without any superintendence on the part of the Board of Trade, but by our bill it is provided that any scheme for amalgamation shall go before that Board for approval. The Metropolitan Board being interested would be duly heard, and under any circumstances whatever the scheme would be thoroughly investigated. A great deal has been said about the exceptionally low price enjoyed by our consumers, but in the amalgamation which has just taken place north of the Thames, the Independent Company who were included were supplying gas lower than either the Chartered or Imperial Companies, and must have shortly further reduced their price; yet the Board of Trade gave their approval to the amalgamation. If you take a large and general view of the supply of gas, it is impossible not to find some inequalities of price and condition. I should like to say, in reference to this question, that if power to amalgamate is denied us directly, there is the power existing for the Chartered Company at once to absorb us, by application to the Board of Trade, who wish to see a complete amalgamation.

Mr. CRIPPS: You are quite wrong there. The impression of that body is that there should be one company on the north and one on the south side of the Thames.

Re-examination resumed: If the power to amalgamate, which we now ask, be refused, it will be a great incentive to us to throw ourselves into the arms of the Chartered Company, for good or bad. If we have to give 16-candle gas under penalties, we should, in point of fact, in order to be safe, have to give from 17½ to 18-candle gas; so that, when we offer 16 instead of 14 candles, we substantially offer an improvement of two candles in illuminating power, the cost price of which is 3d. at the minimum. Last year the discussion with reference to the sliding scale was ultimately carried against the companies, though they fought hard against it, my company among the rest. The initial price was also a point of contention, the companies urging that a fixed unalterable price of 3s. 9d. was not fair and reasonable for a manufactured article, which must depend more or less upon the cost of the raw material. They wanted a greater range. With regard to the auction clauses, they were suggested to me by some of the witnesses, but they were not in the bill, and so were not before the committee.

The CHAIRMAN: I do not quite understand whether or not any alteration has been made with regard to the formation of a reserve-fund since the Act of 1869, or whether the deliberation of the committee last year resulted in any change.

Mr. RICHARDS: No question is raised about that. The company may put by a sort of insurance-fund for certain purposes, amounting to 1 per cent., and when the charge for gas is less than 3s. 9d., they may, instead of dividing an increased dividend, put the excess by, in order to meet hard times. That money belongs to the shareholders, but they can forego it. In that way the reserve-fund is formed, and that supersedes the fund formed under the Act of 1869.

The CHAIRMAN: Then what is the case? Supposing, independently of the action of the sliding scale, in the natural course of things, without any alteration in the price to the consumer, the profit, owing to the cheapness of coal, exceeded 10 per cent., was that to be carried to the reserve fund to any extent?

Witness: Not at all. The old reserve-fund was taken out of the pockets of the consumers, the new one out of the pockets of the shareholders.

Re-examination concluded: Looking at the geographical positions of the several stations south of the Thames, I am of opinion that the companies will be more economically worked in unison than separately. The supply will be more regular and less liable to accidental interruption, one of the main points being not having the cost of long inland carriage of coals. Besides, the other companies will soon find it necessary to obtain other land for additional works, and this we can supply, as our station would be a most admirable one for distri-

bating to the others. Under the operation of the sliding scale it becomes, I think, almost immaterial how much capital we have. I do not think that question can affect the public at all. We have no interest in spending a penny more capital than is absolutely necessary. We shall spend as little as possible, as we get no advantage in issuing new capital, if the auction clauses are imposed upon us. With the sliding scale, when we have reduced our price one penny per 1000 feet, we can take one quarter per cent. more dividend, or put it to the reserve-fund if we prefer it, and of the two the latter would, I think, be the better course.

TUESDAY, MAY 23

Mr. *Harry E. Jones*, examined by Mr. RICHARDS.

I have had considerable practice and experience in metropolitan gas matters for the last 15 years, and at present am one of the engineers of the Commercial Gas Company. I was engineer of the Ratcliff Gas Company six years previous to the amalgamation of that company with the Commercial, which took place with the express consent of the Metropolitan Board of Works. I have frequently been over the works of the South Metropolitan Gas Company. The district supplied by the company is susceptible of very considerable increase of lighting. The capital they ask for under the present bill is likely to last them from nine to ten years. I agree with the last witness that if an amalgamation were to take place amongst the southern companies, including the South Metropolitan, the river frontage of the Phœnix Company would be the best suitable for manufacturing to the largest extent, and the South Metropolitan Works would be suitable for storeage and distribution. The latter company's works have all the modern inventions, improvements, and so forth. Their business increases yearly at the compound rate of 8 per cent. There is water access to the works by the canal, but that access has to be paid for—it is not like a river frontage. The management of the company has been simply admirable; and the other companies have all failed to come near it. The Metropolitan Board of Works set them up as a sort of good boy, whose example was to be followed. I am aware of the amalgamation which has taken place between the companies north of the Thames. My father is a member of the Metropolitan Board of Works.

Mr. CRIPPS objected to the witness giving evidence of the proceedings of the Metropolitan Board of Works.

Mr. RICHARDS said he proposed to read the report of a committee, presented to the Board, on the subject of the proposed arrangements. [This report appeared in the last number of the JOURNAL.] The learned counsel said that upon the report being read, Mr. Roche moved its adoption, when an amendment was proposed, which was lost by a considerable majority, and the original motion was carried.

Mr. RICHARDS: The amalgamation having taken place, with the sanction of the Board of Trade, on the north side of the Thames, and that discussion having taken place at the Metropolitan Board of Works, I presume it seems probable that amalgamation will take place on the south side of the Thames, does it not?

Witness: That was my impression from reading the report.

Mr. RICHARDS: Can you conceive any earthly reason why the powers of amalgamation should be refused to the South Metropolitan Company, if they are granted to the other three companies?

Witness: No; quite the reverse. I think it would be of great advantage if their good management could be extended. At the present moment the South Metropolitan Company may have their powers absorbed by The Gaslight and Coke Company. I think it very desirable that, if there be any amalgamation on the south side of the Thames, the South Metropolitan Company should be incorporated in that amalgamation, and that they should occupy a leading position. Their good management commends them, to my mind, as being a company that should have the lead in any such amalgamation. The whole system of the sliding scale is based upon a notion of a corresponding benefit to the shareholder on the one hand, and to the consumer on the other. The South Metropolitan Company at present are only bound to supply 14-candle gas, which practically means 15½ or 16 candles under penalties. Now they propose to supply 16-candle gas under penalties, which means 17½ or 18 candles.

Cross-examined by Mr. CRIPPS: As an expert, having cognizance of all the leading facts in connexion with the general policy of gas companies, I think I am as well able to form an opinion as other persons.

Mr. CRIPPS: I dare say you know that a clause was inserted in the Commercial Act of last year directing that although you should have the power of raising a certain sum as you wished, yet you should go before the Board of Trade from time to time to satisfy them as to the amount of the sum which should be raised for immediate purposes?

Witness: Yes: we were to get a certificate.

Mr. CRIPPS: You ask for a certain sum—say £70,000, or whatever it may be. Then Parliament gives you the power to raise the amount, but you cannot raise it in a lump sum, or without going before the Board of Trade to show how much you require in the next three years or some definite time?

Witness: I do not think you are quite correct. A considerable portion of it can be exercised at our will. It is provided that we must raise a portion of borrowed capital corresponding in amount with the ordinary capital.

Mr. CRIPPS: Neither borrowed nor share capital can be raised beyond a certain amount, which you show to the Board of Trade to be necessary for you during the three years next prospectively.

Witness: Yes; but then we must have spent a considerable portion before we can do that.

Mr. RICHARDS: We have a clause in this bill to the effect you mention.

Mr. CRIPPS: If you do not object, I do not say another word about it.

Mr. COATES: We assent to your clause touching the increase of capital after £250,000.

Mr. RICHARDS: From the first we have accepted the clauses in The Gaslight and Coke Company's bill.

Cross-examination resumed: I have not heard that the Metropolitan Board of Works have changed their opinion about the South Metropolitan being a model company, and that they do not desire to keep them as such. In my opinion the amalgamations north of the Thames have not been productive of much economy up to the present time.

Mr. CRIPPS: You know the circumstances of the South Metropolitan Company. If that company amalgamate with some other—the South Metropolitan having managed their affairs so well—all the economy and management of that company may, in future, inure, not to the benefit of their district, but to the benefit of the district with which they may amalgamate, may they not?

Witness: They will be extended to the other district; they will not be taken away from their own.

Mr. CRIPPS: But supposing they have amalgamated with some other company that have not been doing their work equally well, and are charging a higher price, then there will be one price charged throughout the two districts of one united company?

Witness: I am not so sure of that.

Mr. CRIPPS: May not amalgamation have the effect of raising the present price in the South Metropolitan district to a higher price, which will be the price of the adjoining districts with which they amalgamate?

Witness: Not necessarily, although it might be done legally.

Cross-examined by Sir M. WELLS: The initial price is the main pivot upon which amalgamation turns. As representing the Commercial Company, I strongly opposed amalgamation with the Chartered Company, because I considered it would work injustice both to my company and to our consumers.

Sir M. WELLS: Where is the limit to be drawn in reference to the question of uniformity? Supposing it could be shown from the accounts of the South Metropolitan Company that they are in a position at the present moment to reduce their price, what figure do you put as the limit within which this principle of uniformity is to be applied? Supposing they can afford to sell gas for 2s., would you then apply to that district the initial price of 3s. 9d.?

Witness: It would depend upon what considerations entered into the power they had to supply at 2s.

Sir M. WELLS: The first benefit, I suppose, to be received would be a statutable increase of illuminating power?

Witness: Yes; that would take place here. Having to supply 14-candle gas, they allow themselves a margin of about two candles; but it is not a 16-candle gas that would pass the Act; the average being occasionally over would not answer the purposes of the Act. There is a penalty directly you are under it. There cannot be any dispute that the company must increase their illuminating power under the bill by nearly two candles. At present the consumers are dependent upon the good will of the company, and upon their voluntary exercise of extremely good management for keeping the gas at the low price it has been lately. The company have in their present Act the power to charge 3s. 6d., and it is quite clear that any laxity or relaxation of their high standard of management would involve the consumers in that price; in fact, they ought to have paid 3s. 6d. a year ago. I am cognizant of the management of every London company, and I say that there has been something more than due care and management here. There has been a starving of the concern, almost, for wear and tear. I think that you can hardly say that it is the duty of the manager to give his flesh and blood, which has been pretty nearly done in this case. Under this bill it will be to the interest of the company to keep the price down. They will have a distinct pecuniary interest, as well as the moral good will which has prevailed. The company will lose every time they advance their prices, and gain every time they reduce their price. Another benefit to the consumer is, that in case of another coal famine, or any other vicissitude of trade—such as iron going up to an enormous price—when the price reaches above 3s. 9d. the company must forego their dividends, whereas under their present Act they can apply for revision, and obtain their 10 per cent., no matter what may be the circumstances. During the coal famine the South Metropolitan only charged 3s., but they were not able to do it in the strict sense of the term. They went to some irregular accumulation of profits to the extent of 2d. per 1000; they starved their works in the way of wear and tear to the extent of another 3d. per 1000, and they went on buying coals in a sort of hand-to-mouth fashion, which was a very risky thing to do, and might have involved the shareholders in considerable difficulties. They took their chance of that, and so contrived to squeeze another penny. I consider that when they run a risk of that kind, straining every nerve, they are not doing that which a company would do who sat down and took things comfortably.

Sir M. WELLS: You mean to represent to the committee, as an abstract question of justice, that if the South Metropolitan Company supplied gas to consumers at 2s., they ought to come to an uniform standard of 3s. 9d.?

Witness: Yes, if you can conceive such a thing arising in the way this arises now; because their capability does not spring out of anything peculiar to the district of Camberwell, or to the consumers; but out of the prudence of their own shareholders in the past history of the company, and that gives them a security which must ever be their own, and cannot be yours, unless you can induce Parliament to fix an exceptional price for gas.

Sir M. WELLS: Suppose the accounts of the South Metropolitan Company show such excess of profits that they can pay 10 per cent, does it not follow that there must be another fall, and that the consumers will have the benefit of it under the present system?

Witness: That is the strict letter of the Act, but I have seen in London such a a variety of what you call "due care and management," that I know that would be swallowed up and disappear altogether, unless the company were kept stimulated to the very high pitch of good management which they have reached; and you cannot keep them stimulated to that by Act of Parliament. You must prove, before the consumer takes it, that they can do it again. You cannot lay your hands on exceptional profits. Mr. Newton disapproved of the amalgamation of the Great Central Company with the Chartered; but that was a very different kind of amalgamation to that now proposed. Under the Act of 1860, the surplus profits, after the payment of 10 per cent., belonged to the consumers; but that Act did not fix a standard price, it gave the companies a margin. The Act of 1868 replaced that by a Revision Commission, which always gave 10 per cent., no matter how the price of raw material might go up. If the shareholders are placed in a position to divide 11½ per cent., I do not think the consumers will suffer.

Re-examined by Mr. RICHARDS: I am aware that Mr. Newton disapproved of amalgamation under certain circumstances. I know that he was a member of the Metropolitan Board of Works at the time they acquiesced in the amalgamation between The Gaslight and Coke, the Imperial, and the Independent Companies; he died just as it was concluded. I also know that in the discussion on the 12th of January at the Metropolitan Board, Mr. Newton was the spokesman of the Board. The Independent at that time were supplying gas at 3s. 4d., but the price was raised to 3s. 6d. before the amalgamation took place. The South Metropolitan Company are now in precisely the same position in which they were when Mr. Forster's committee of last year concluded their inquiry.

Mr. RICHARDS: Do you remember the application made by the Metropolitan Board of Works last year, to treat the South Metropolitan Company upon an exceptional footing, so that whilst they allowed the standard price of 3s. 9d. to other companies, 3s. 6d. should be their standard price?

Witness: I recollect Mr. Forster declined it most emphatically. I think the amalgamation of the companies north of the Thames would result in a benefit, even if the consumers of the South Metropolitan Company suffered a slight increase for a short time; but I think they are protected against that by the sliding scale. It is within my knowledge that the consumers of the Independent Company urged the Metropolitan Board to object to the amalgamation on their behalf, and the Board did interfere, but with little effect. I am aware that the Metropolitan Board consented to the amalgamation which took place a few days ago. The operation of the sliding scale alters amalgamations altogether. A company now know, if they ally with a poorer company, they lose their chance of dividend; therefore the whole thing is on a different basis from what it was when they amalgamated under what I might call a guaranteed dividend. During the coal famine there was nothing to prevent the South Metropolitan Company from raising their price as other companies did. They would have been entitled to have raised their charge 5d. per 1000 feet.

Mr. *Frederick J. Bramwell*, examined by Mr. RICHARDS.

I have been President of the Institute of Mechanical Engineers, and am at present a member of the Council of the Institution of Civil Engineers. I am familiar with the main features of the South Metropolitan Company's bill. I consider that the increase of capital which the company are asking for, and the borrowing powers, are reasonable, looking to the probable increase that may take place in 10 or 12 years.

Mr. RICHARDS: With regard to the sliding scale and standard price applied to a large number of companies last year, do you see any reason why they should not be applied to the South Metropolitan Company in the same way?

Witness: I thought that there had been a most exhaustive inquiry, and that the principle was settled. It appears to me, if I may offer an opinion upon what Parliament have already done, that it is most desirable there should be

such a principle. There certainly can be nothing much worse than having a mode of payment of dividend which does not give any inducement for improvement. The sliding scale does give such inducement, and I looked upon it as a settled question. It would be cruelly unfair to make an exception in the case of the South Metropolitan Company. An amalgamation of the other companies, leaving out the South Metropolitan, seems like asking to amalgamate a man's hat and boots, and forbidding an amalgamation of his body. You have the two ends meeting, leaving out the middle. I cannot imagine that if it is good for the other companies it can be bad for this one. Without this it would be obviously incomplete. I should think the amalgamation would tend to economy. The South Metropolitan, being up the canal, are liable to have their supply of coal cut off by a severe frost, which would be a serious thing both to them and to the consumers. If they were in connexion with stations upon the banks of the Thames, all fear of that kind would be avoided, and the large store of coal they now have need not be kept.

Mr. RICHARDS: Can you conceive any reason why, considering the mode in which the affairs of the South Metropolitan Company have been conducted, they should be put under terms less favourable than other companies?

Witness: Only as a punishment for good behaviour. That is the only thing I can imagine.

Cross-examined by Sir M. WELLS: I do not say that uniformity of legislation for the metropolitan gas companies is important; but it seems to be natural and fair.

Sir M. WELLS: Therefore, if you have, with regard to nine-tenths of the metropolitan gas legislation, prescribed what are known as the auction clauses, do you not think it would be very unnatural and very unfair that it should be different from the remaining tenth?

Witness: I am afraid it must be submitted to. I do not like the clause, but I do not see how you are to distinguish.

Re-examined by Mr. RICHARDS: The auction clauses were not included in the Commercial Act of last year.

By the COMMITTEE: I do not know of any reason in the nature of the business why the management of amalgamated companies should be less economical than that of independent or separate companies. I can see there may be reasons why amalgamation is unfavourable to certain companies. You may have some powerful company overloaded with capital, and other companies may amalgamate with them. That may be a bad thing; but if you have, as I suppose we shall have, the sliding scale universally employed, then there is every reason for economical management as well with amalgamation as without it. As regards the actual cost of production, there is no distinction between the two systems. I do not think either the Phœnix, the London, or the Surrey Consumers Companies are very high in point of capital.

Mr. PHILBRICK: The Phœnix are as high as any in London, except The Gaslight and Coke Company; they are £8 3s. per ton, The Gaslight and Coke Company being £8 7s., or 19*s.* 8*d.* per 1000 feet, as against 20*s.* 3*d.*, so that they are the highest but one. That was in 1869. In 1874, The Gaslight and Coke Company had a capital of £8 8s. 2d. per ton, or 19*s.* per 1000 feet; while the Phœnix had a capital of £7 11s. 1d. per ton, or 16*s.* 8*d.* per 1000 feet.

Witness: The South Metropolitan, the Commercial, and the Ratcliff are among the lowest.

Mr. MICHAEL: The great difference is that the South Metropolitan require 11*s.* 3*d.* to pay a dividend and interest, while the Phœnix require 15*s.* 7*d.*?

Witness: I think we may be perfectly sure of this, that a company possessed of a capital which would enable them, by careful management, to derive benefit from the sliding scale, would not amalgamate with a company possessing a capital so great that they could not derive any benefit unless arrangements were made which would properly deal with all their respective capitals.

Mr. CRIPPS, on behalf of the Metropolitan Board of Works, said he was by no means disposed to reopen what was called the gas question in any way. It was no part of his business to defend what was done by Lord Cardwell, or Sir John Trollope, or Mr. Forster; he simply said that, after the fullest possible inquiry last year, Mr. Forster, as chairman of the committee, approved of what was proposed by the Metropolitan Board of Works, because, as he said, in the opinion of the committee, it was thought quite as advantageous a settlement for the companies as for the consumers themselves. It was very natural for the gas companies to complain of any interference with their proceedings, but that was a matter which had been settled. Sir E. Beckett had stated that he did not know until the present time that the Chartered Gas Company—which, in their amalgamated state, represented two-thirds of the whole gas supply of the Metropolis—had accepted the auction clauses.

The CHAIRMAN: Is that the only point you are going to urge—the question of the auction clauses? Because I may state that the committee are quite agreed that the auction clauses must be put in. As to the amalgamation, the committee are in favour of the principle of giving the company power to amalgamate with other companies.

Mr. CRIPPS: That is the further point I have to oppose.

Mr. COATES: On behalf of the promoters, we bow to your decision as to the auction clause.

Mr. CRIPPS said, with reference to the amalgamation, there was no doubt that, in the earlier history of those matters, it was thought the amalgamation was a great remedy for many of the evils of gas companies, that would be the means of introducing very great economy; and the result was to leave open amalgamation to the companies as an optional matter. If, on the first introduction of amalgamation, it had been thought that the principle was good, and the companies had been compelled to accept it, all would have done so; the mistake was, in the first instance, leaving it optional. The result was that those companies to whom amalgamation was beneficial, as against the consumer, did amalgamate; and the amalgamations which would really have been beneficial to the consumer did not take place. There were some companies who could divide 10 per cent., and leave a large surplus over. If a company in that position remained unamalgamated, that large surplus would have gone in the reduction of the price of gas to the consumers in the district; but supposing in some other district there was a very great deficiency, their being amalgamated with what he might call the more "model" district, would take away from the consumers, in that "model" district, the benefit which they would have had, from the surplus funds of the company supplying that district, and would appropriate those surplus funds to themselves, so as to ensure their getting 10 per cent. in their own district. That had been the result, in effect, over and over and again, and, therefore, it was that every one who had considered the matter at all said that, so far as amalgamations had gone at the present time, they had not been for the benefit of the consumers. He did not say that was the case with all amalgamations; but, inasmuch as it was optional with the companies to amalgamate or not, and inasmuch as they had no interest except the 10 per cent., and the consumers had, amalgamations took place for the benefit of the companies, and not of the consumers. To apply that to the case of the South Metropolitan Company in the previous year, after the discussion on the general case, inasmuch as the sliding scale would at once have enabled that company to raise the price for their own benefit, special application was made that they should not be allowed to increase the price at which they were then supplying gas. The other districts were charging 3*s.* 9*d.* and 4*s.*, but the South Metropolitan were enabled, by superior management, to supply gas at 3*s.*; and, therefore, when 3*s.* 9*d.* was named as the general price to be adopted throughout the Metropolis, the consumers of the South Metropolitan said, naturally, that was a very hard thing upon them, because if the company were able to divide more than 10 per cent., the obvious result would be, that they would at once raise the price to 3*s.* 6*d.* However, upon application being made to Mr. Forster, that gentleman declined to consider the matter, as the committee considered uniformity to be a very desirable thing; and he (Mr. Cripps) did not intend to raise that question again on the present occasion. Then came the other point—were they to allow that to be inevitably done indirectly, by allowing the South Metropolitan to be amalgamated with other companies which were charging considerably more? The South Metropolitan could have no inducement to amalgamate with any of those companies, but those companies had the greatest possible interest in amalgamating with the South Metropolitan. The capital of that company was small in proportion to what they did—small on every ton of coal they consumed, and in every 1000 feet of gas they made. Having that small capital, if they amalgamated with an adjoining company, the two capitals would become one, and the capital per 1000 feet would, of course, be raised directly. Suppose the South Metropolitan became amalgamated with, say, the Phœnix or any other company, their grand management in the past and their economy would be brought in to aid the rest of the capital of the Phœnix Company, and, therefore, to aid the consumers in the Phœnix district; and whereas the consumers in the Phœnix district were paying 3*s.* 9*d.*, and those in the South Metropolitan district 3*s.*, the result of that amalgamation would be to make the price 3*s.* 4½*d.* over the whole district. Under those circumstances, what the Metropolitan Board desired was, not at all to interfere with the general principle of amalgamation, but for the committee to say that power to amalgamate with any other company ought not to be granted unless that special question should be considered by Parliament—that was to say, supposing the South Metropolitan should desire to amalgamate with the Phœnix, or the Surrey Consumers, or any other company, an inquiry should take place which could be attended by the Metropolitan Board and the consumers, so that, if that particular amalgamation should be granted, it would be granted by a committee.

The CHAIRMAN: Why should they come before Parliament? Have not the Board of Trade the power, in each case of a proposed amalgamation, to determine it?

Mr. CRIPPS said they had, but the machinery of the Board of Trade was very inadequate for the purpose of thoroughly correcting a matter of that kind. What the Metropolitan Board objected to was that they ought to have a matter of that importance investigated by Parliament. The committee had heard that the Phœnix Company did seek power in 1872 to amalgamate with the South Metropolitan. That point was thoroughly discussed in Parliament, and before a committee, and those matters which he (Mr. Cripps) was now putting before the committee as objections were, no doubt, only a repetition of what was stated upon that occasion, when the committee refused the power, or rather when the bill was withdrawn, because it was obvious the committee would not pass it. The company desired to have power to go before the Board of Trade, and for that Board to decide upon their amalgamation; but the Metropolitan Board of Works said, "We do not desire you to have that general power; we wish Parliament to reserve to itself the right of investigating a particular case;" and that was the whole question. The general question of amalgamation was not in dispute; but this particular case of amalgamation was greatly in dispute. The other companies south of the Thames had been before the Board of Trade with reference to the general bill of the present year, and one or two matters had been agreed to; but the Board of Trade considered that the South Metropolitan Company stood in a different position—that they were before Parliament, and that the question was to be discussed between them and the Metropolitan Board—and the Board of Trade, therefore, expressed no opinion upon the subject. It was going very much beside the question to talk about the Metropolitan Board having last year proposed the South Metropolitan Company, and this year opposing them. So far from opposing them, it was desired that they should remain just as they were. It was not desired that a company who had conducted their affairs so well should be absorbed in some other and larger company. Instead of wishing harm to the South Metropolitan Company, his clients had seen with pleasure their past prosperity and good management, and they wished that to continue; but if anything should be proposed as to amalgamation with any particular company, and the Board thought, upon going into the circumstances, that that prosperity would continue, and that the consumers of the district would not be put to a disadvantage, they would most readily consent to it. All they desired was, that it should not be done without an inquiry being held, and that that inquiry should be open and before a parliamentary committee.

Sir M. WELLS, on behalf of the Vestry of Camberwell, said he thought he should be able to satisfy the committee beyond all doubt that a stand ought to be made by Parliament against that principle of uniformity, which would work an injustice to nearly 200,000 people. He asked the committee, in common justice, to treat that community as an independent one, with the rights of citizens; and he had a perfect right to say that, if advantages had been received owing to special circumstances, in reference to the supply of gas, no fancied principle of uniformity ought to deprive them of that which was a benefit, and which, if they were deprived of, would be inflicting upon them wrong and injury. There might be the same regulations and the same restrictions applying to one, two, three, or a dozen companies, although those companies might be charging different prices for their gas; and, therefore, he hoped the committee, in dealing with the question, would consider they were in no way jeopardizing the question of uniformity of regulation and restriction in the matters to which he would call their attention, as distinct from that which was known as a standard or initial price, and that the question of price was one which must be decided upon its own merits, and upon the circumstances surrounding the affairs of the company charging that sum. On the northern side of the Metropolis there were gas companies supplying hundreds and thousands of people, and which companies had an enormous amount of capital. Those companies had taken very good care of themselves. In the table which had been handed in, the committee would see the highest charges made by those different companies; and he (Sir M. Wells) would say, with the utmost respect for Mr. Forster, that his committee ran away rather with that question of high charges on the part of those companies, and so thought they were giving to the community at large a real benefit, in fixing the price at 3*s.* 9*d.* It was not the first time in the history of parliamentary proceedings that great wrong had been done, and that Acts of Parliament had been passed on a panic cry; and he would undertake to show that but for the panic price which had been paraded before Mr. Forster's committee—which appealed, no doubt, *ad misericordiam*, to his judgment—with regard to the position of those companies, they would never have fixed against the people of London such a high charge as 3*s.* 9*d.* What benefit would it be to the rest of the community if the South Metropolitan district were to be taxed beyond what they were at present? What did it signify to the gentlemen north of the Thames what those on the southern side paid? In the district he represented there was no comparison to be drawn between the working of the South Metropolitan and that of the companies who had come under the uniform principle with regard to standard price and other matters. The question of uniformity might be a question in reference to the companies, but what did it signify to a person living in the Strand whether there was a standard price at Camberwell of 3*s.* 9*d.* or 3*s.*? The Metropolitan Board of Works had always felt the injustice that would be evoked against their constituents on the southern side of the Thames. In their petition there was a distinct allegation that there ought to be a differential price as against the South Metropolitan Gas Company. Mr. Cripps had stated that he did not come before the committee to urge that point, because it would be inconsistent; but he (Sir M. Wells) thought the

Metropolitan Board of Works never came to a conclusion so unfair and erroneous as that. There would have been more consistency if the Metropolitan Board had said, "We are satisfied with the work we have done, and it will not be inconsistent on our part to say that whilst the principle of uniformity is just and appropriate as regards the northern side, it is unjust and inappropriate as regards the southern." They did think so when they presented their petition to Parliament. The committee were not bound by the recommendation of any previous committee. The case came before them on its own merits, and on its own merits it must be determined. Let them go one step further and see what was the position of things. It was a novelty to hear a witness recommending himself to a tribunal before whom he was examined, and saying he had conducted his business in a proper way. He could not, and ought not to receive any merit beyond that which arose to an industrious and good servant, from those by whom he was employed; but he had no right to use that against the public, and say, "Because I have managed the company so well I am entitled to consideration as against the consumers." They had not reduced the price voluntarily, but they were bound to do it. Their reserve-fund was full, they divided the maximum 10 per cent., and what were they to do? They were under a parliamentary obligation to give the surplus profits to the consumers, and if the committee would stay their hands in fixing upon that large and populous district the standard price of 3s. 9d., they must again lower their price. They had a small capital, they had a large and increasing district, and, according to the evidence of a very intelligent witness, Mr. Chubb, there was nothing exceptional in their district which would entitle them to consideration. What was the evidence upon which the committee were asked to fasten upon that district a larger sum than they were paying at the present time? It was for the committee to say whether 3s. was not sufficient, looking at the certain probability of it being reduced to 2s. 8d. by the good management of the company, and by the peculiar circumstances attending them. The committee could not place the South Metropolitan in a better position than they were in at present. They had the cheapest gas in the Metropolis; they had good gas; the company were worked well, and, therefore, they had a body of consumers satisfied with their present position; and then, forsooth, Parliament was asked to overturn that mutual position which they occupied. Let them see what would be the effect. If the committee gave that initial price, they enabled the South Metropolitan Company immediately to convert their dividend of 10 per cent. into 11½, and it was transparent that the consumers would lose to that extent; because, if the 1½ per cent. were not added to the 10 per cent., it would have been surplus profit going to the consumer. Then they came to the question of amalgamation, and the company said, "We can afford to give gas to this neighbourhood for 3s., or 2s. 10d., or 2s. 8d., and here is our share. We offer ours to you; you are charging more; it might not be worth while for you to give us so much if there were an ordinary amalgamation without any initial price; but, inasmuch as that initial price has increased the value of our shares by giving 11½ per cent., what will you give us?" That was a mercantile question which was easily to be solved. Respecting the principle of uniformity, the Metropolitan Board found some of the districts being charged a very high price, and the committee knew the external influence that could be brought to bear upon a body like the Metropolitan Board. The majority of their constituents were affected in that way, and, of course, his (Sir M. Wells) constituents, who were a minority, though a very large minority, could hardly expect a board so constituted to look at their interests, and to say what was strict justice to them. He mentioned this, because the committee must not give too great heed to the position of the Metropolitan Board of Works. It was remitted to the committee to decide the matter, and all he (Sir M. Wells) could say was, that if the Board of Works had no further evidence before them than they adduced before Mr. Forster's committee in reference to this question of uniformity, it was, very briefly, evidence to establish a principle to work injustice upon a large community. He had endeavonred to place before the committee that question of initial price as it bore upon his clients, and he wished them to bear in mind that there was no remedy against the company if they raised their price from 3s. to 3s. 9d., although it would be a cruel injustice upon the poorer consumers who were obliged to burn the gas. If the initial price were fixed at 3s. 9d., and amalgamation with the Phœnix sanctioned, the whole of the district would be doomed from the day the bill was passed by Parliament, and how could Parliament reconcile strict justice with fastening upon the people that enhanced price? There was no precedent for it. Parliament had never attempted to do it in the question of bread or any article of food, and gas was just as great a necessity to the poor as those articles. It had never been suggested by Mr. Livesey that their customers had been clamorous. They had taken the gas at the price the company knew they could afford to sell it at, and had not in any way worried them. The Board of Works ought to have come before the committee and, as they had alleged in their petition, they ought to have said, "We will give all proper countenance to this people to enable them to retain their gas at the price which, according to the circumstances of the case, they have paid of late years, and on which we believe there will in a short time be a still further reduction." In conclusion, he (Sir M. Wells) said he did not intend to call any witnesses, because the case spoke for itself, and the committee were just as capable of giving an opinion upon it as any hundred witnesses he might produce. He trusted they would give their decision upon the principles which always guided committees in dealing with private bills, and that they would advise the House as to what, in their judgment, was the real justice of the case.

Mr. MICHAEL said he appeared on behalf of the Vestry of Lambeth, and there were four points to which he would direct the attention of the committee. The first was with respect to the initial price; secondly, with respect to the new capital; thirdly, the conditions under which that capital should be raised; and fourthly, the amalgamation of the South Metropolitan with other companies south of the Thames. At present the company had a maximum price fixed, beyond which it was impossible for them to go without further legislative sanction, and they were obliged to conduct their operations in such a way that with skill and economy they should pay to their shareholders a dividend not exceeding 10 per cent., and if, by their working, they obtained more than that amount, the benefit went to the consumers in the shape of a reduction in price. The price at which the South Metropolitan Company had supplied gas and earned their 10 per cent. up to the present time was 3s., and he acknowledged their works had been conducted with singular skill and ability. They had always had the motto "Excelsior." Messrs. Livesey, father and son, had stood at the head of their profession, and had furnished an example, which every other gas company had endeavoured to follow, in producing cheap gas; but in order to test the matter, when Mr. Livesey was in the box, he (Mr. Michael) started with the principle that every gas company might be taken, as before the committee, to be competent to produce gas at the same price—that was to say, all circumstances being taken as equal, the cost of manufacture and distribution of gas might be taken as similar; but the one thing which was to govern the absolute price at which gas could be supplied, as between one company and another, was to be found in the amount of dividend which it was necessary should be paid upon the capital employed by the various companies. He did not want to take the committee over all the companies, but would confine his attention entirely to the two companies with which it was probable the South Metropolitan might be amalgamated. With respect to the Surrey Consumers, the amount necessary to pay the dividend on their capital was 1s. 4·4d., and the amount necessary for the Phœnix was 1s. 3·7d.—in the one case a difference of 5d., and in the other of 4d. It had been said that there ought to be some uniformity of principle carried out as between the whole of the companies supplying the Metropolis—that was to say, however diverse might be the conditions upon which to form a corollary, the corollary should be the same. Putting it shortly in that way, it was sufficient to show that the capitals were so different as to require in the one case 4d., and in the other 5d. more, in order to see that the uniformity could not, by any possibility, prevail. Moreover, uniformity did not prevail even in the most recent legislation. The Commercial Act of last session entirely differed, with respect to the raising of capital, from the other regulations which applied uniformly to all the gas companies north of the Thames; so that whether the committee took it one way or the other—whether they passed the present bill with auction clauses or without—it was totally impossible to have uniformity. A uniform bill could not be passed unless some of the legislation, even so recent as last session, were repealed. At the present time the South Metropolitan Company were supplying a gas, nominally of 14 candles, but in reality, as Mr. Livesey said, of 16½ candles for 3s. Mr. Livesey had said very fairly that in order to raise the standard of 14 candles to 16 an additional price of 3d. must be put on, representing 1½d. per candle. But a great deal of the force of that remark was lost by the fact that Mr. Livesey himself said, "We are at the present time supplying 16½ candles, and charge 3s., so all that it will be necessary for us to do, according to the new standard which we propose to put in the bill, will be to supply 17½ candles." What would happen if the bill passed? From that moment a burden of 6d. would be imposed on the gas consumer, and the company would be given 1½ per cent. for no consideration whatever. They would have 3d. for the two candles of better supply; they would charge 3s. 3d.—their initial price being 3s. 9d.—and at once they would weight every consumer with 6d., as against the Chartered Company, merely because by accident they had a capital lighter than other companies. Having exercised all this skill, having exercised all this integrity, they had carried on their enterprise in the best possible way, and for what? For philanthropic and benevolent motives? Had it not been to secure themselves 10 per cent.? And they had secured it, and were competent to continue it; and now, without any show of reason, but merely because other companies charged 3s. 9d., and could hardly manage to earn 10 per cent., they wanted to have 11½ per cent. Had one single argument or fact been advanced to show that more than 3s. 3d. should be the initial price which should be granted to the company? Representing the vestry, he (Mr. Michael) did not want to have 6d. put upon the consumer for no reason whatever but that Mr. Livesey chose to give evidence, in the last session of Parliament, in support of the principle of uniformity, fixing the price at 3s. 9d. Had the price been 4s. 6d. for the other companies, upon the same principle he might have asked for that now; but the committee were bound to look at what were the reasons adduced, why a certain state of things should be altered which might inure to the disadvantage of the consumers. As to the question of capital, he wished the committee to look at the fact that the present capital of the company invested was, in round numbers, about £400,000, and he suggested the adoption of what were technically called auction clauses—that was to say, that the public might have the opportunity of purchasing the new capital. They had heard from Mr. Livesey that at the present time the value of a £100 share in the company was £200. By the auction clauses, £100,000 put up to sale would realize £200,000—that was to say, upon £100,000 10 per cent. would be paid, but upon the other £100,000 no dividend would be paid. It would, in fact, go in the coffers of the company as capital receiving no dividend, and therefore as security to the old shareholders that they would receive their dividends. It would, moreover, be a capital earning a profit, and therefore enabling a reduction of price to be made on the one hand, or an additional profit to the company on the other, for their increment of capital so invested. At the present time the company had £400,000. When they had issued £100,000 of capital, there would be £500,000 receiving a dividend, and £100,000 receiving none at all; that was to say, when they had called up £100,000, they would have £100,000 earning dividend, but not paying it, and therefore it reduced the cost of supplying gas, and put 10s. into their pockets, enabling them to increase £10 to £10 10s. per cent. The next £100,000 would make it 11 per cent., and the next 11½ per cent., thus giving to the shareholders continually an increasing interest in working the concern economically, in order to ensure to the shareholders a large amount of profit. It had been said, "Why should you take away from the gas company the incentive to economical working?" He (Mr. Michael) said that by the scheme he proposed to the committee there was every incentive. As they had the sliding scale, they might divide 20 per cent. If they increased the ambit of their works, took in fresh spheres of operation, increased the supply within their district, and required further capital, then for every £100,000 there would be 10s. per cent. added to their dividend; so that the auction clauses, instead of being something simply in the interests of the public, when worked in that way, by the premiums being put into the capital, and receiving no dividend, was, first, continually ensuring to the old shareholders their 10 per cent., and, secondly, it was constantly tending to increase the profit which was derived from the old share capital. On the last part of the question—that of amalgamation—Mr. Livesey was obliged to acknowledge that the influence of those amalgamations had constantly been against the interests of the consumers of gas. Great companies had absorbed the smaller ones, who were supplying gas at a cheaper rate, and the result was, that the amalgamations, instead of tending to diminish the price of gas, had constantly led to an increase as regarded the smaller districts. All that Mr. Bramwell could say was that in an impossible contingency—one which had never occurred—viz., the occurrence of such a severe frost that the South Metropolitan Company would be prevented from having a supply of coal, then it would be an advantage to them to have the river frontage of those other two companies, in order to supply them with coal. Against that hypothetical case, the absolute fact showed that, as far as the Vestry of Lambeth were concerned, there would be a penalization upon the consumer of 3d. upon every 1000 feet of gas. There were no advantages to accrue. Mr. Livesey himself said: "The circumstances are equal here. I cannot make gas under better circumstances than the Surrey Consumers and the Phœnix. The only question is the relative amount of capital." Under those circumstances, merely to accomplish the idea of uniformity, the committee were asked to carry out amalgamation, which it was confessed had only acted to the disadvantage of the consumers in the north of the Metropolis. If economy would be the result of amalgamation, there might be some argument for it; but what was the fact? Up to the present time the South Metropolitan Company had stood at the head of all the companies, whether in the Metropolis or elsewhere; they had been the model gas company; they had been charging less for gas than any other company; they had been pointed to as the one gas company whose example ought to be followed; who had conducted their works with such skill as to be admired and held up to admiration—nothing being left undone, and nothing left untried; and yet on account of that good conduct in the past, Mr. Livesey, with some little show of temper, said, "I am not going to attempt to conduct my works in the future as in the past." Surely that was unworthy of a man in Mr. Livesey's position. He (Mr. Michael) believed that in the future, as in the past, all that could be done would be done to secure a good supply of gas. On the other hand, what would happen when Mr. Livesey joined the others, who, from the confession of facts, were unable to act as beneficially as he did for the good of the consumers? It must lead, without any advantage, to the disadvantage of all those who consumed gas in the South Metropolitan district. What more was wanted? Was it not clear that, by giving that initial price, the committee would at once place a benefit in the hands of the South Metropolitan; and if the power of amalgamation were given, no benefit whatever could accrue to the companies themselves—it left them in the same position—but with regard to the consumers they would, by increasing the initial price, place upon them a burden from which there was no escape, and which, from experience, gained very largely in the other portions of the Metropolis, was sure to be inequitable.

THURSDAY, MAY 25.

The committee met this afternoon at two o'clock, and the clauses of the bill were proceeded with.

On clause 4, giving power to the company to raise additional money by the creation of shares or stock,

Mr. *Coates* (parliamentary agent) said the object was to enable them to raise £250,000, by ordinary or preference shares, subject or concurrent with raising £62,500 by loan. The latter would bear only 5 per cent. interest, and therefore the public were interested in the company raising as much as possible in that way.

Mr. O'HARA objected to the company having power to raise money on preference shares, and maintained that the effect of the clause as it stood would be to render the sliding scale inoperative. There was no limit in the bill to the rate of dividend to which these preference shares would be entitled, and it might be that the company, finding that if they issued ordinary shares they would be subject to the sliding scale regulations, as to price and dividend, would give the legislation on this point the go-by, and issue all their new stock as preference capital. It was very desirable that there should be identity of legislation in respect to metropolitan gas affairs. As to the borrowing powers, the Metropolitan Board asked that a provision should be introduced to this effect—"Provided that the company shall not pay any higher rate of interest on money so borrowed by them than at the rate of 3 per cent. per annum."

Mr. RICHARDS said he was utterly unable to understand his learned friend's allusion to "identity of legislation," as the very foundation of "identity of legislation" was gone when the committee decided that the initial price of gas supplied by this company should be 3s. 6d., instead of 3s. 9d. With that decision all hope of amalgamation was gone. It was perfectly clear that no amalgamation could take place between three companies, who had a 3s. 9d. initial price, and one company who were limited to 3s. 6d.; so that, so far as identity of legislation was concerned, he confessed that, unless things hereafter took a different turn, it seemed to him that it was hopeless. With respect to the issue of preference shares, it was well known that, because of the greater certainty they enjoyed, they were always issued at a lower rate of dividend than ordinary shares. Surely, it was an advantage to the public that preference shares at a low rate of dividend should be issued, rather than that all new capital should come within the sliding scale, and be entitled, under certain circumstances, to even more than 10 per cent. Certainly, those who objected to preference shares ought also to object to the issue of debentures, which were a higher class of security still.

Mr. *Coates* proposed to limit the dividend on preference shares to 6 per cent.

Mr. O'HARA still objected, and

Mr. RICHARDS said he would save his learned friend trouble. The company saw their way to get a much higher rate of dividend by issuing the new capital as ordinary stock, and would take it all in that form.

Mr. O'HARA proposed several new clauses in substitution of clauses in the bill referring to tests for purity, &c., his object being, as he again stated, to secure uniformity of legislation.

Mr. RICHARDS objected to the substitution of clauses which were only verbally different from those inserted by the promoters, for the professed sake of an object which, so far as this company were concerned, was quite unattainable. In one of the clauses it was proposed to insert a penalty of £50 for defect in purity, and if the committee accepted these clauses he should ask to have the words "not exceeding" inserted before £50.

The CHAIRMAN asked whether there would be any opposition to these words.

Mr. CRIPPS said they were not in The Gaslight and Coke Company's bill, nor in the general bill, and it was not advisable to have them here.

Mr. RICHARDS said if the words were not in The Gaslight and Coke Company's bill they ought to have been. But there was no analogy between the companies, and it would be an iniquitous injustice to impose upon the smaller company a penalty for default, as great as upon the larger one.

Mr. O'HARA argued that there was no injustice in it, because the smaller company, having fewer stations to contol, had fewer opportunities of infringing the law; but if they did do so, seeing in what a lenient spirit the penalty clauses were drawn, they ought to have the full penalty inflicted upon them.

The CHAIRMAN said he for one would prefer to have the words "not exceeding" inserted, but as Parliament had not thought fit to introduce them in the case of other companies, the committee did not think they could insert them here.

Mr. O'HARA then proposed several more clauses, which he said were in place of other clauses in the Company's Act of 1869, the object being to make the present bill identical with that of The Gaslight and Coke Company. Amongst these was a clause with reference to the position of the testing-place, which provided that it should be "fixed by the referees at not less than 1000 yards distant from the station from which the gas to be tested thereat is supplied, but so that not more than one testing-place be required for each station at which gas is manufactured." It also provided that the company shall find and maintain such testing-places, apparatus, and materials. Another clause provided that there should be tests for pressure, &c.

Mr. RICHARDS was heard in opposition, and

The CHAIRMAN said the committee were of opinion that the same clauses with regard to testing should be inserted in this bill as were in The Gaslight and Coke Company's bill.

Mr. O'HARA said the petitioners would furnish the necessary matters to be put in the schedule. After this he thought there would be no more difference between them.

Mr. RICHARDS said there would be a very material difference, and he might as well take that opportunity of addressing the committee on the subject of illuminating power. The committee had decided to fix the initial price at 3s. 6d. instead of 3s. 9d., as in the case of the other companies. Under those circumstances he would ask that the illuminating power should be left at 14 candles, as at present, which his learned friend had admitted over and over again to be practically 16 candles. He made this application on what he considered very sufficient grounds. In 1863 Lord Cardwell's committee fixed the Chartered Company's illuminating power at 16 candles, at the price of 3s. 9d., and they were permitted to take 10 per cent. upon their stock. In 1869 the Imperial Company obtained the privilege of supplying 14-candle gas at 3s. 9d., and in consideration of that they had to content themselves with 7 per cent. upon their new stock instead of 10. In the same year the South Metropolitan Company asked for 10 per cent. dividend and 14 candle illuminating power in consideration of taking a price not more than 3s. 6d., which was the lowest price ever introduced into any metropolitan bill. It was quite clear that there were two ways of treating price—it might be either raised or lowered, or the committee might insist upon a higher or lower quality of article. If they insisted upon the company giving 16 candle gas under penalties, in lieu of 14-candle gas under penalties, it was evidently the same thing as lowering the price of gas. And if they now adhered to their determination to fix the initial price at 3s. 6d., he asked them not to do the company the injustice to force upon them the necessity of supplying a better article.

Mr. CRIPPS said this was a direct effort on the part of his learned friend to repeal what the committee had already decided, and although the parties in whose favour it was decided were absent, yet it would affect the Metropolitan Board in a most material manner. The company had brought in a bill, which, upon the face of it, by their own concession, followed the legislation of last year respecting the illuminating power of gas supplied to their district—viz., 16 candles—they brought in their bill on that assumption, and there had been no notice to the Metropolitan Board or to any one else that they would ever dream of supplying 14-candle gas. The whole thing they had been discussing throughout was 16-candle gas; that was what the company themselves proposed, and bound themselves to supply. But in consequence of a decision of the committee to reduce the initial price to 3s. 6d., they now proposed to alter the illuminating power to 14 candles. He did not believe it could be done, no notice having been given of such an intention. Sixteen-candle gas was the standard in the Metropolis, and it was with reference to that, of course, all the opposition had been directed. Had the company proposed in their bill to fix the illuminating power at 14 candles, the petitioners would have had to lay before the committee the evidence presented to Mr. Forster's committee last year, to prove that the standard should be 16 candles. But they inserted 16 candles, and this was nothing more than an attempt, by a side wind, to repeal what the committee had decided, and to repeal it in a way most objectionable to the consumers.

Mr. RICHARDS: Bear in mind that the vestries expressed themselves satisfied with the 14-candle gas they got.

Mr. CRIPPS: The vestries have gone away.

Mr. COATES: They assent to it in their petitions.

The CHAIRMAN: The committee cannot go back upon their former decision as to 14 candle gas.

The committee then adjourned for half an hour, to enable the agents to arrange clauses in conformity with their decision, and on resuming

The clauses were proceeded with and passed, and the chairman was directed to report the bill to the House.

TUESDAY, APRIL 4.

(*Before Mr.* ORR-EWING, *Chairman; Col.* RUGGLES BRISE, *Lord* RENDLESHAM, *and Mr.* BROGDEN.)

STOCKTON AND MIDDLESBROUGH WATER BILLS.

(*Continued from page* 730.)

Dr. *Charles Meymott Tidy*, examined by Mr. SUTTON.

I am a Bachelor of Medicine, a Master of Surgery, a Fellow of the Chemical Society, and a Member of the Royal College of Surgeons. I am also a Professor of Chemistry and Forensic Medicine and Public Health at the London Hospital, and Deputy Medical Officer and Officer of Public Health for the City of London. I have been engaged for many years with Dr. Letheby in making analyses, both as regards water and sewage. I have myself made a separate analysis of the water of the Tees, as supplied to the towns of Stockton and Middlesbrough. The samples were samples taken by Dr. Letheby himself. When he came back he felt very ill, and was doubtful in his own mind whether he would be able to complete the analyses. I had no knowledge of them beyond the fact that they were samples taken by Dr. Letheby. I had only the labels on the bottles, which were put there by him, and told me where the samples came from. There were fifteen altogether, and I consider the water in every respect very excellent for domestic as well as for manufacturing purposes—for domestic, because of its purity; and for manufacturing, because it is a comparatively soft water. I have supposed that the whole of the sewage goes into the river at Barnard Castle, and I am perfectly convinced that the whole of it would be oxidized. If there was a choleraic discharge at Barnard Castle of the worst description, or even of typhoid, persons living at Darlington or Stockton, after the river had run 17 miles, might drink the water with perfect safety. I should say that if sewage was mixed with 20 times its quantity of water, and had a run of 20 miles, no sewage would be found, at the end of the distance, by chemical analysis.

Cross-examined by Mr. VENABLES: I have made experiments on this subject on the Irwell, near Manchester. If there was an epidemic at any place I should have no hesitation in drinking water into which their sewage had discharged if it had flowed ten miles. I admit that water containing choleraic or typhoid discharge might be a means of propagating disease, but it could be drunk with safety after a run of eight miles. I cannot say which part of the sewage it is that produces cholera or typhoid fever. As Dr. Frankland cannot prove the presence of germs, I cannot, on the other hand, disprove them. I do not say that the sewage from a healthy person will cause cholera; but I cannot say there are cholera germs in cholera sewage, for there is a doubt as to their existence.

Re-examined by Mr. SOMERSET: I have had large opportunities for testing the point for the last ten years, and that enables me to say that the Barnard Castle sewage is perfectly innocuous before it reaches the water company's intake.

By the CHAIRMAN: When the water was taken in March, I do not know whether the river was in a swollen condition. It was turbid as taken from the Tees, which I should regard as an indication it was swollen. If the samples had been taken at the lowest state of the river, it would not have altered my views in the slightest, as I have very strong opinions on the subject of the innocuousness of sewage, and say that one part of sewage in 20 of water would be safe.

The CHAIRMAN: You scientific gentlemen appear to differ very much, as some witnesses have said that 1 in 1000 was too much sewage for safety, others 1 in 500, and others 1 in 250, and you have got down to 1 in 20.

Witness: I do not give it as theory, but as the result of experiments.

Mr. *William Crookes*, examined by Mr. SOMERSET.

I am a Fellow of the Royal Society, an analytical chemist, and Vice-President of the Chemical Society. In March last I went to the junction of the Balder with the Tees, and visited the pumping-station below. At the pumping-station the river is of considerable width, five or six feet deep, flowing rapidly, clear to three feet deep, and there are no signs of mud or deposit on the banks, while the stones in the water are covered with moss. I examined the whole course of the Tees for signs of sewage, and did not find any. The samples of the water I took were clear and inodorous. The river was sometimes still and sometimes tumbling over rock and gravel, and in the best condition for being thoroughly aërated. The river is good for fish, full of water-wheels, and favourable for oxidation. I examined the filter-beds at the intake, but did not find any sewage matter. I was told the filters were cleaned once a year, and the sediment was not offensive. I saw one of them empty, and there was not more than a quarter of an inch of sediment on it. There were no signs of sewage in the river. At the junction of the two rivers the Balder was slightly darker than the Tees, and had a peaty appearance. At Barnard Castle I saw no privies; the sewer was an iron pipe, down which no sewage was flowing. I consider the Tees water to be better than most waters in the kingdom, and compares favourably with the London waters, rain water, Grassmere, and Loch Katrine.

Cross-examined by Mr. BIDDER: I cannot say whether the Tees water contains more or less organic matter than the Thames, but it contains less organic nitrogen, which is the worse part of organic matter. I have very great doubt as to the existence of germs, but the evidence is very strong that epidemic disease is propagated by water. If the amount of sewage in water is so small that one cannot detect it by chemical analysis, I think it cannot do any harm.

Mr. *William Jones*, examined by Mr. SALISBURY.

I was at one time secretary of the water company, but am now a manufacturing chemist at Middlesbrough. I am a consumer of about 25 million gallons per annum of the company's water which is used in the manufacture of many chemicals, Epsom salts in particular. We make about 4000 tons per annum, or 80 tons a week, and require a very pure water for the purposes of our trade. I produce a sample of the water taken on March 27th from the tap. It would be impossible to produce the silvery lustre of Epsom salts without perfectly pure water; still we do not filter before using it. We also require pure water for making oxalic acid. The Tees water is good for the purpose, although it

has small quantities of lime and iron in it. When I was secretary of the company I took a great many samples of the Tees from above Barnard Castle down to Yarm, and they have been analyzed by chemists. There was a great prepossession against the water in Stockton, and it was condemned for a long time; but it was hailed in Middlesbrough. I have drunk the water for thirty years and never found it prejudicial to my health. I confirm what has been said as to the absence of sewage. I may have seen a little above Barnard Castle, but none between that place and the intake. As a rule it is a fine clear river when there has been no rainfall.

By the CHAIRMAN: I used the water when I lived in Middlesbrough. I had a filter in the house, but I do not know that it made the water any better. A filter would not take the peaty colour out unless it was a bone charcoal filter.

Mr. *Hopkins*, examined by Mr. SUTTON.

I represent the firms who are together the largest ratepayers in Middlesbrough and the largest consumers of the company's water. It is absolutely necessary to have good water for the steam boilers, and we use only the company's.

The CHAIRMAN intimated that it was not necessary to go into the quality for manufacturing purposes.

Examination resumed: We found that the water direct from the river was not sufficiently good for manufacturing purposes, as when we used it there was incrustation of the boilers and deposit, but this we did not find after using the company's water. We have had scarcely any complaint to make as to the quantity of water supplied by the company, nor have I heard complaints from other manufacturers. My workmen drink a great deal of water, and I have heard no complaints from them, nor do I find the water unpleasant to d ink myself. I am satisfied with the way the water company supply us, and with the price. I think we are safe in their hands, and I say that as a user of water. As a ratepayer, I object to the corporations coming in and supplying water at an enormous expense in the first instance, and in a way that may in the end prejudice the interests of manufacturers. As a user of the water I also object, as it may affect the rates charged for consumption.

Cross-examined by Mr. BIDDER: I am not prepared to say the corporations would not manage the works economically. They have possession of the gas-works, which they manage well; but, notwithstanding that, I do not think they would manage the water-works as well as the company. Of course the application for power to take 50 per cent. more water means for them to be ready for increased consumption, and that will mean increased revenue. When they take the extra 30 million gallons a week, the revenue may possibly be over £60,000 a year if they can maintain their prices. With £10,000 a year surplus income now, and a prospect of £20,000, I do not know that it looks like being a burden on the rates. I do not know whether it would be difficult to raise £700,000 for the works, on the security of the rates, without anything being put as a burden on the ratepayers. Assuming that the figures are correct, it would not be difficult, but I think the supply of water could be got for much less money. We only pay on one-third of our rateable value on one-third of my works; but on the other two-thirds we pay the same as other ratepayers. I believe the rateable value of Middlesbrough is £187,531, and that of Stockton about the same. Taking the two together as £370,000—and it is still increasing—there is a large area over which to distribute the burden, if burden there were. Of course, there will be revenue from the new districts, after the works are completed. There would be a small source of additional revenue from supplying Yarm, and that applies to the other places the corporations propose to supply. I do not always filter the water for drinking.

By Mr. SHIELD: I am not aware that the company propose to put a line of pipes across the Tees on the level of the bed of the river. If they were laid in a position to prevent the flow or interfere with dredging it would be detrimental to the river. I am aware that the deepening and dredging of the river is one of the most important works undertaken by the Conservancy Board, but think the scouring power of the river is one of the most important agencies in that deepening. I think the quantity of water which the company propose to abstract would not diminish the scouring power.

By the CHAIRMAN: I do not know what the Glasgow Water Committee charge, but if it is 3d. per 1000 gallons I should be rather surprised. Small consumers pay much more comparatively than large consumers, so that my interests in that respect are perhaps not identical with those of the other ratepayers. I say the company have supplied me and the rest of the district with excellent water, and, speaking both as a ratepayer and consumer, I think it very desirable that the supply should remain in their hands.

Mr. *Gjers*, examined by Mr. SOMERSET.

I am partner in a firm of ironmasters at Middlesbrough, using about 30 million gallons of water a year. I consider that water taken from the river direct is entirely unsuitable for manufacturing purposes. We take all our water from the company, although our works are on the river's bank. During the last 20 years we have been supplied with excellent water at a very reasonable price. I do not think any one can object to the quality of the water. I should prefer that the supply should remain in the hands of the company.

Cross-examined by Mr. BIDDER: I drink the water as it comes from the works, as at my office I have no filter. At my house there is one, and I believe it is used, though I do not know why the water is filtered. I should have no fear, if there was a violent outbreak of typhoid or cholera at Barnard Castle, in drinking the company's water. I think there is a power, in such a stream as the Tees, to purify the water from the sewage discharged at that point. I believe that the company supply water at a cheaper rate than the corporations could, and I feel, as a ratepayer, that it is very doubtful whether the two corporations will always work well together. The burden on the rates would be increased; the working men are already heavily taxed, and that ultimately comes out of the pockets of the employers, who have to pay higher wages. I am aware that most of my men support the scheme of the corporations, but that is because they are easily led by their promises.

Mr. *Hansen*, examined by Mr. SUTTON.

I am a member of a firm at Middlesbrough, who consume a considerable quantity of water for manufacturing purposes. We have used the company's supply for twelve years, and consider it excellent, while for domestic purposes it is very fair indeed. I concur generally in what Mr. Hopkins has said. I am not favourable to the transfer of the company's works to the corporations, as I would rather that the supply should remain in the hands of the company, who have served us so well. I have no confidence in a corporation managing a commercial concern. I have heard about the pollution of the river Tees at Staindrop, but think many of the statements have been exaggerated. I do not think it is a place likely to increase. I have known it ever since I was born, and I do not think there have been half-a-dozen houses built there in 20 years. The population is about 1200. I know the stream on which it is situated, and never saw in it any dead pigs. The drain that falls into the stream is four or five miles from the Tees, and the water has to flow that distance before it gets to the river. I do not think Staindrop would contribute to the revenue of the corporations undertaking. I understand that two of the wells at Staindrop were found to be slightly infected through an imperfect drain, but that has been remedied. If the corporations were to lay their pipes right through the village, I do not believe half-a-dozen people would use their water, because they have already a sufficient supply free of cost.

Cross-examined by Mr. BIDDER: I have the water filtered in my house, because it makes it brighter and clearer, as after rain it gets discoloured. My firm pay £450 a year in rates to the borough of Middlesbrough.

By the CHAIRMAN: I have not the same confidence in the corporations as I have in the company. Of course it is their interest to manage well, in order that we may be satisfied: so it would be that of the corporations.

Mr. *Whitwell*, examined by Mr. SOMERSET.

I now live at Saltburn-by-the-Sea, but have known the district supplied by the company for twenty years, as I resided eight years at Stockton. I drank the water of the company for six or seven years unfiltered, and for a year or two filtered. My firm have blast-furnaces in Stockton, and the water of the company is most excellent for our purposes. During the last fifteen years we have not once been stopped on account of failure in quantity. We have used the water direct from the river with very unfortunate results. The consumption at our works is about 20 million gallons a year. It has been rather less during the last twelve months, in consequence of the depression of trade. I have little doubt that an improvement in the trade would involve a greater demand upon the company than perhaps in a short time they would be able to supply, and then they would require extra powers. I am chairman of the Middlesbrough Guardians, and we prefer the company's water to any other.

Cross-examined by Mr. VENABLES: I object to the corporations taking the water company's works, as I believe the cost of supplying the water will materially increase. I think it would be an intolerable burden upon the small ratepayers to have to make up the loss that would be incurred by the enormous works proposed by the corporations. I am interested in that manner as an owner of small houses. I think the corporations are more likely to lose money on an outlay of £1,200,000 than the company on an outlay of £350,000. The district is no doubt increasing; but it does not follow that the increased power of pumping and of raising money will be required immediately. The company's charge for water over the whole district is on an average of 3·86d. per 1000 gallons, and that I do not think the corporations would ever do. There would be an increase of the charges, both for manufacturing and domestic purposes. I can speak of the great economy with which everything has been done by the company.

By the CHAIRMAN: Four per cent. on £1,200,000 would be £48,000, which would be a very reasonable rate to borrow at. The company collect, I believe, £41,000; their profit is £31,000 odd, and I believe they divide £23,500. The company propose to borrow £300,000, at 7 per cent.; that would be £21,000 a year. That added to £23,500 would be £44,500. Their other liabilities would, no doubt, be equal to £3000 a year. That would bring the liabilities of the company to within £500 a year of those of the corporations in this matter. I am sorry to say, however, that all these things do not alter my opinion of the scheme. The expense necessary to make the company's works efficient would be comparatively very moderate, and I cannot possibly conceive what is the reason for wishing to change the supply. I think if a compensation reservoir or reservoirs were constructed, the flow of the river would be kept up, I do not believe there is provision in the bill for such a reservoir.

By the COMMITTEE: I have very little doubt that all opposition from the corporations would have ceased if the company had embodied in their bill a provision for making a compensation reservoir such as I have spoken of, and had also applied for an injunction to restrain Barnard Castle from discharging sewage into the river. I should say the corporations might be able to borrow at 4 to 4½ per cent. I have no doubt they could obtain money at that rate.

Mr. *Cochrane*, examined by Mr. SOMERSET.

I am an ironmaster at Middlesbrough, and have been in business for about twenty years. My firm use about 20 million gallons of the company's water every year, and think it thoroughly good, both for manufacturing and domestic purposes.

Cross-examined by Mr. VENABLES: I think if the company were allowed to take more water from the Tees they ought to provide a compensation reservoir. If that cost £150,000, and the money were borrowed at 7 per cent., it would, of course, increase the annual expenditure by £10,500. I think the expenditure by the corporations is unnecessary.

WEDNESDAY, APRIL 5.

Mr. *Pease*, the chairman of the company, was recalled, for the purpose of proving a resolution passed by the board of directors on the previous day. It was as follows:—"Resolved, by a board of directors of the Stockton and Middlesbrough Water-Works Company, that the company will undertake, with or without the Corporation of Darlington, to apply for an injunction to restrain Barnard Castle and other places (if any), by which the river Tees is injuriously affected by sewage, from discharging their sewage above Tees Cottage. And, further, that if this company are allowed to take an additional supply of water from the Tees at or near their present pumping-station, they will apply to Parliament next session for leave to construct a reservoir above their point of intake, so as to compensate for the abstraction of water during the dry weather flow."

Sir E. BECKETT said that the statement he had made, that the water company could apply for an injunction to restrain the discharge of sewage into the river, had been called in question, but he had since had an opportunity of ascertaining the law on the point from a very high authority, and was convinced, as he thought at the time, that the water company could apply for an injunction.

The CHAIRMAN: I do not know whether we could put a clause in the present bill to meet the question of a compensation reservoir.

Sir E. BECKETT: That kind of thing has often been done in parliamentary committees.

Mr. *David Thomas Anstead*, examined by Mr. SOMERSET.

I am a Fellow of the Royal Society, and was Professor of Geology in King's College, London. I have been for more than thirty years engaged in matters connected with water supply, and generally on the application of geology to practical purposes. I know the Tees district. I was there in March this year, and considered the district with regard to its geological and physical conditions. When I was there last the Tees was in its flood. I have seen it sometimes high and sometimes very low in a turbid state. I went from Darlington to Middleton-in-Teesdale, and also to the Lune and Balder, up to the place where it is proposed to erect reservoirs. Beginning at the beck that enters the Tees at Middleton, I observed there the village of Middleton, and I am aware of the existence of mines at the upper part of the river. I looked carefully at the bed of the stream, and I could see no appearance whatever of any sewage matter. I observed a good deal of fluor spar that came from the mines, and a considerable quantity of sand, but nothing that could injure the water. I then went to Mickleton, a long straggling village of about 100 houses, and a population of 500, not having any regular drainage at all. It is some distance from the river, and there is no communication of any mischievous kind from there to the river. I then went to Ronaldkirk, between which place and Middleton there is hardly a house. Ronaldkirk is a small clean village, on high ground, with about 60 small detached houses. There is no communication of sewage to the river at all, and it seems impossible to conceive that any sewage should be discharged into the river from that place. The next place I went to was Cotherstone where there was nothing that suggested contamination of the river. It is a general practice in that part of the country to place the privies and ashpits back to back, and the ashes are thrown amongst the sewage matter, and left there until collected for the purpose of putting on to the land. Between Cotherstone and Barnard Castle there seems to be scarcely anything in the way of a village. I went through Barnard Castle, and looked along the river. The village is built rather high on the boulder clay or rock and has a population of about 4000 inhabitants, the drainage entering the river at a short distance below the town. I went to see the sewage outfall which is about a 15-inch pipe. Near the outfall the water of the river is very much discoloured but a little below I could see no symptom of sewage. There are, besides the

main outfall, several small drains or culverts; but I saw no discharge from them. I went also to Westwick, which is a very small village, having no communication with the river. Whoriton is also a very small place, and I could hear of no sewage discharge there. Wilston is a very small place on high ground, containing 23 houses, and I saw no sewage there. Going on, I went up a little beck that flows into the river, until I came to Staindrop. It is a small town, and the beck runs about four or five miles from it before reaching the river. Before the beck reaches Staindrop, it runs through Raby Park. There is a new drain in the town, and about a dozen culverts communicate from it to the river. The population, I was told, was about 1200 there being 250 houses, but I saw no sewage in the beck, and it did not seem to me that any sewage, from the 12 houses I saw on the bank, found its way into the beck. Gainford was the next place I went to. It is a small pretty village of about 250 inhabitants, 50 houses, and the gas-works. I inquired about the latter, and found that all the water from them was collected carefully into a pit. There is no discharge of sewage into the river. The next place I went to was Piercebridge, where there was nothing at all likely to injure the river. The next was High Coniscliffe, where I found clear indications that all the sewage, such as it was, went into two old quarries, the population being about 230. Low Coniscliffe is also small, and rather off the river; but I did not go there. Those are the whole of the villages on the Tees down to the company's intake. I consider the water, as delivered at Tees Cottage, is no more affected by sewage than any river in any inhabited part of the world. There must be a small amount of sewage; but it is very little indeed—so small as to be practically of no account. I find the water, as compared with other waters, to be of perfectly good quality; and I think Dr. Frankland's evidence confirms that. I have the death-rate of several English and Scotch towns, and out of 50, 36 are higher than Darlington, and 12 lower. They are supplied with water from all sorts of sources. I find of ten towns, two are supplied with water of the best quality, four from good wells, and four from good springs. The average death-rate of the whole is 23·03 against Darlington 22·03. Of 35 towns in Scotland, 32 where higher than Darlington, and the death-rate was lower nowhere. Middleton is over 30 miles from the pumping-station by the river. I visited the site of the proposed reservoirs of the corporations. The geology of the district was properly described by Mr. Gunn; but he had not alluded to the fractures in the rocks, which are principally on the Grassholm site. They are in the long dykes of the North of England, which come together there in the boulder clay. These appeared to have been borings, and I had others made at several points. The material brought up consisted of stiff boulder clay, and gave indications of those large boulders and gravel often found; but there was also evidence of the existence of a band of wet running sand in the line of the reservoir. I saw indications of slips in the boulder clay near the bed of the stream, and after going down 30 feet they came to this band of sand. I am satisfied that the cost of a trench cut in that position must be very considerable.

Cross-examined by Mr. VENABLES: When visiting the district I went from Darlington in a carriage, and got out and walked to the places on the river. There had been a flood a day or two before, and if it was a high one it would have washed away any sewage there might have been on the banks. There is a churchyard at Gainford, but not draining into the river. There is some water coming into the river there, but it is perfectly pure. I do not know that Cotherstone and Barnard Castle are places of summer resort of visitors, but I believe Mr. Bowes is building a museum at the latter place at a cost of £500,000, and this may attract visitors.

Re-examined by Mr. SOMERSET: There was no appearance of such a flood in the river, when I visited the place, as would have washed away the traces of sewage. There had been rain—there was rain at the time, and the river was consequently rather high.

Mr. *Dixon*, an iron shipbuilder at Middlesbrough, and a magistrate of that borough, said he used about 3 million gallons of the company's water every year, and had no complaint whatever to make respecting it. He was not in favour of the Corporations Bill, but preferred that the water supply should be in the hands of the company. He and his family had used the company's water unfiltered for 17, years and had not suffered from doing so. He paid about £120 a year to the company. As a shipbuilder he had no dread of the further abstraction of water from the river proposed by the company, as he had no fear that the amount to be taken would make any difference in the scour of the Tees in its navigable part, which was up to Stockton Bridge. In cross-examination he said he would prefer water without sewage to that which had a great deal, but the Tees had so little that it was not worth thinking about; in fact, it was so pure that he did not wish to change it for any other.

Mr. *Robson*, of the firm of Robson, Strangpool, and Co., Coatham, said his firm used between 30 and 40 million gallons of the company's water a year, and were supplied very well indeed, both as to quality and quantity. Their men drank the water, and he had not heard any complaints of it from them. He thought if the supply were transferred to the corporations the inhabitants would fare worse than at present.

Mr. *Head*, managing partner of the firm of FOX, Head, and Co., Middlesbrough, said they used the company's water for their 23 boilers, and found it of very good quality indeed. He used the water at his residence, both for drinking and domestic purposes. He had two pumps at his house, drawing from wells, but he had more confidence in the company's water than in that from any well in his locality. The neighbourhood was a very healthy one, and though nearly all used the water, there was no illness traceable to it. The company had given satisfaction as to their supply.

Mr. *Thompson*, an alderman of the borough of Middlesbrough, and a justice of the peace for the county, said he lived at Middlesbrough when the company first introduced their water there, and he looked upon it as a great boon to the district. He used it for all purposes, and liked it very much. He thought that the company had served the district well, and that the corporations had plenty to manage without taking up with the water supply.

Mr. *Jones*, one of a firm of finished iron manufacturers, said they used between 15 and 20 million gallons of water a year. This they had from the company, and had no complaints to make, they having been well supplied both as to quality and quantity. He had lived in Middlesbrough 13 years, and had always drunk the water unfiltered. He had never traced any illness in his family to the water, which he considered pure and wholesome, and for himself would prefer that the supply should remain in the hands of the company.

Mr. *Elgee*, manager of Messrs. Backhouse and Co.'s Bank, said he had been in the habit of using the Tees water for domestic purposes, and had found it at all times wholesome and good. His house was formerly supplied by a well, but he gave it up in order to be supplied with water by the company. The fevers that had been in the town he attributed to manure being thrown about the place in heaps. Speaking for himself, he was altogether opposed to the corporations having anything to do with supplying the district with water.

Mr. *Minchin*, agent for the owners of the Normanby estate, said that the district of Normanby north of the Tees was already supplied with water, but that on the south was in great need, as the wells upon which a portion of the town depended had been condemned as bad. The cattle had to be driven 1½ or 2 miles two or three times a day to get water. It was very important for them to get a supply before the six years which would be taken to complete the corporations scheme. He had no objection to the corporations if they would not supply the district with hot water instead of cold.

The CHAIRMAN said the witness seemed to think the quarrels of the borough might be imported into the water.

Mr. *Anderson*, an engineer and contractor, said he had lived at Middlesbrough for 30 years, and recollected the company's works being constructed. He had not noticed that the Tees had been injuriously affected by the abstraction of water so far, and if any difference arose in consequence of the proposed increased quantity to be taken, it would be very small. Before the company's works were established, the ironmasters got their water by pumping directly from the Tees. He had no objection to the supply as at present, and was less afraid of the Barnard Castle sewage than of the tender mercies of the corporations.

Mr. *Robinson*, resident engineer of the company at Middlesbrough, produced his plans of some borings he had made the previous Friday at Limedale. At one place he found sand at a depth of 4 feet 6 inches, and there seemed no likelihood of coming to an end of it. He found another boring, which had been made by some one else, to a depth of 22 feet below water-level, when they were stopped by a boulder. At another place a bore-hole, 30 feet in depth, ended in boulder clay. He made a trench, at another spot, 12 feet deep, and there also found boulder clay. In cross-examination, he said he had had a consultation with Mr. Abernethy, Mr. Charles Hawksley, and Mr. Anstead, and they requested him to take the borings for the purpose of seeing the nature of the strata at this spot. He did not know that the fact of a boulder being found on the same level as the sand would prove that the sand was in a pocket, and not in a continuous stream. He thought the bore-holes should have been made to a greater depth than it was proposed to make the puddle trenches. He was not prepared to say that Mr. Mansergh and Mr. Hill were wrong in the depth to which they bored, but he would have gone deeper.

Mr. VENABLES said the attention of the engineer to the corporations had not been called to this point, because it was not suggested by the company that any question would be raised upon it. He therefore thought he ought to have an opportunity of asking him about it.

Mr. *Mansergh* was then recalled, and said that he took the borings for the corporations scheme. He bored to a depth of 28 feet, though he did not think it necessary to have gone more than 15 feet. In making his estimates, he had left a margin in case difficulties might be met with that could not be anticipated. He fixed the sites for the reservoirs, and afterwards appointed the highest authority he knew of to test his impression of the suitability of those sites.

THURSDAY, APRIL 6.

Mr. *Robinson* was recalled, and produced a sample of the sand found at the site of the corporations reservoirs, washed and made clean of the clay.

Mr. *Gunn*, recalled on behalf of the corporations, said that several trial holes were made, and he reported on all the sites originally proposed for reservoirs. There was one site, on the upper part of the Lune, on which he reported unfavourably, and that was subsequently abandoned. There were some slight slips near the river, but not in the embankments, and he saw no outcrop indications of sand in the neighbourhood. Sometimes a thin band of sand was found in clay, but he found no trace of any at this place. Sand in the boulder clay was generally found in pockets in that part of the country.

Mr. *Hill* and Professor *Anstead* were also recalled on behalf of the corporations, and examined as to the sand and its effect in the construction of the reservoirs.

Mr. *James Glaisher*, examined by Mr. SOMERSET.

I am a Fellow of the Royal Society, and have been engaged in meteorological surveys for over 40 years. I have been in the habit of visiting various districts with regard to the quantity of the rainfall. In July, 1875, I had gauges prepared, and selected sites in the Tees district for them, and also on the Lune, Balder, and Greta.

Mr. VENABLES asked whether this evidence was to show there ought to be a greater compensation.

Mr. SOMERSET said it was to oppose the Corporations Bill altogether.

Mr. VENABLES said if the Corporations Bill passed the company would cease to exist, and although Darlington might be interested in the Tees Fishery Board, he could not see how the company had anything to do with it.

The CHAIRMAN said they must hear what the witness had to say.

Examination resumed: The drainage area of the Lune and Balder is 30,567 acres, at a mean altitude of 1430 feet above the level of the sea. The mean rainfall is 48·39 inches, and the average rainfall of the whole district is 40·24 inches. The absorption and evaporation of the valleys will leave 26·84 inches available, and that will give 48¾ million gallons a day. The compensation to the streams is one-third. The average height of the whole district is 1212 feet down to the intake. The drainage area down to the intake is 202,481 acres, producing on an average 350 million gallons for every day in the year.

Cross-examined by Mr. VENABLES: I cannot tell what proportion the highest flood bears to the lowest water. We consider 300 times as great is the quantity in Yorkshire valleys, but I consider the average flow is an important element. I know there is no storeage here, and flood waters are of no use except for scouring purposes. The year 1873 was the driest for any purposes, and I inquired whether there was any want of water in the Tees, but did not hear from any one there had been any deficiency in that year. I do not know what would be the lowest flow per 1000 acres. It has always been the practice to give one-third for water compensation on account of the millowners, but they are sometimes bought off for money, and then less water is given.

After some conversation, the further proceedings of the committee were, in consequence of the illness of Mr. Hawksley, adjourned till Friday, April 25.

(*To be continued.*)

Legal Intelligence.

HIGH COURT OF JUSTICE—QUEEN'S BENCH DIVISION.

WESTMINSTER, WEDNESDAY, MAY 17.

(*Before Justice* BLACKBURN *and a Special Jury.*)

SUGG *v.* SILBER.

(*Continued from page* 771.)

Mr. *David William Sugg*, son of the plaintiff, was called to give evidence as to the construction of the various parts of Sugg's "London" burner, and of Silber's burner. He said he had made a comparison with the photometer between the two burners, and when they were both consuming the same quantity and quality of gas at the same pressure, the results were exactly alike.

Cross-examined by Mr. ASTON: Silber's burner was practically as good as Sugg's. The nose-piece of the one could be put into the nose-piece of the other. The cones were also similar in shape, though the cone in Silber's burner was reversed. [Witness described very minutely the construction of the Silber burner to his lordship and the jury, and detailed the principle on which he calculated the relative areas of the two burners].

Mr. *Richard Pearson*, an assistant to plaintiff, confirmed the statements of previous witness.

Mr. *Thomas Wills*, examined by Mr. WILLIAMS.

I am gas examiner to the Metropolitan Board of Works and have for some years paid great attention to matters relating to gas. It is necessary, in my position as gas examiner, to make myself acquainted with all kinds of burners. I have examined the Argand burner, and agree that when it was introduced it was a novelty and an improvement. I concur with the evidence of the previous witnesses as to its merits. I have examined the defendant's burner, and find that the illuminating power of the gas, when burnt through it, is equal to that of the plaintiff's Argand. The principles upon which the results produced by Mr.

Silber's burner depend are the same as those in the "London" burner. The greater part of the means to carry out the principles of the Silber burner are the same as those employed to carry out the principles of Sugg's burner. They only differ in one or two small particulars. The principles involved in the construction of the "London" Argand burner are, first, the larger diameter of the holes through which the gas issues; secondly, the diameter of the internal aperture and arrangement of the external cone and chimney, and next the abolition of pressure at the back of the orifices through which the gas issues for combustion, and the material of which the burner chamber itself is composed; and I find those principles adopted in the Silber burner. The dissimilarity that I find in the Silber burner is a turned-over cap in the place of the straight cone of the "London" burner. I have seen the burner made by Mr. Sugg for the Trinity House, in which the turned-over cover is similar to that in Mr. Silber's burner. The means by which the pressure is abolished at the back of the orifice of the burner is slightly different in the Silber burner. In the "London" burner this is obtained by the use of tubes of a less sectional area than the total area of the orifices of the burner; while in the Silber burner it is obtained by passing the gas through small holes in a metallic plate. Thus the processes give the same result. No further dissimilarity occurs to me; and with regard to the regulating of the gas by the nose-piece, it is really separate from the burner. There is an adjustable nose-piece in Sugg's burner for regulating the entrance of the gas, and the contrivance in the Silber burner resembles it, with this difference, that the regulating cone is inverted. Those differences would make no substantial difference in the result produced.

Cross-examined by Mr. ASTON: Nose-pieces are well known in connexion with burners. Duff's burner has a nose-piece, a cone, and a washer. The means employed in the Silber burner to abolish the pressure of gas at the orifice are slightly different from those in the "London" burner. There is also in the Silber burner an annular space between the rim, in which the triangular pieces occur, and the base-piece. I do not think that if there were an additional annular space it would increase the difference between the means provided so that the amount of gas issuing through such apertures would be less than the amount of gas issuing through the orifice of the burner. If the total volume with the same pressure in the same time is greater passing through the inlet area than that passing through the combustion area, the pressure could not then be abolished; therefore the principle would undoubtedly be different. I have heard the explanation given in court of the way in which the triangular spaces were measured.

Would you yourself be satisfied with that mode of measuring a space in order to determine accurately the ratio of area?—That is a mathematician's and mechanician's question, and I would rather not answer it.

Is it not a fact that you test areas by passage of volumes of fluids or liquids through them generally?—Not in my profession as gas examiner. I am a chemist, and prefer not to give an answer either way.

The principles which you say are involved in the "London" burner are the large diameter of the holes of issue. That is, I suppose you mean, large as compared with the inlet?—No: I mean as compared with the earlier burners. Before 1863 the holes were made about ·02 of an inch in diameter; after 1863 they were made ·04. The difference between ·02 and ·04 would be the difference between the large and the small holes. In my own mind this was a recognized difference, and I have no doubt it was known to the trade.

Cross-examination resumed: The use of large holes by themselves is one of the essential features in the Sugg combination, and the diameter of the internal aperture would be another feature. It is not the use of the cone and chimney which is special to the "London" Argand, but the particular arrangement of the cone and chimney. The "London" Argand has a straight cone, and the Silber a turned-over cone. As far as the exterior cone and chimney are concerned, there is a difference between the Argand and the Silber burners. The turned-over cone is in the Silber burner and the Trinity House burner. The cone is used for the purpose of bringing the air to the flame, and has been used from time immemorial for paraffin lamps.

Justice BLACKBURN: Paraffin has scarcely been used from "time immemorial;" but that is near enough for us.

Cross-examination continued: I have seen burners with buttons prior to 1869. Assuming the Sugg-Letheby burner is as represented, and assuming the holes of combustion are larger than the inlet area, you would certainly not have the "London" Argand burner. Partly because you would not have there the steatite chamber. I could not take the one part from the other of the "London" Argand burner. The external cone is part of the "London" Argand burner as a combination.

If the Sugg-Letheby burner had the holes in the aggregate larger than the inlet, then you find you have an abolition of pressure at all events?—Not unless at the same time you used the steatite chamber.

Therefore you think that the steatite chamber, in combination with the relative area of combustion and inlet, constitutes the grand features of the "London" Argand?—I do. I have never tested the Sugg-Letheby burner to find the relative area of the combustion with the area of inlet.

Suppose you had been told, the moment you saw a Sugg-Letheby burner, that in order to produce that which you considered a beneficial effect all you had to do was to diminish the area of the inlet, and put in a steatite chamber, would you have had any difficulty in doing it?—No: the mechanical arrangements would have to be altered; but I could give orders to any intelligent workman to do it.

Assuming you were told to make the gas issue from the Sugg-Letheby burner at a comparatively low pressure, and that you must do it by reducing the inlet area, you would have no difficulty in making a workman attain that object?—You could not do it with the steatite chamber.

Were not steatite chambers very well known at the time the Sugg-Letheby burner was introduced?—Yes. It was known that a chamber could be made of steatite or different kinds of metals, and there was nothing to prevent a workman from taking the Sugg-Letheby burner and making the chamber of steatite.

Assuming that instead of making the chamber of metal you made it of steatite, and had those large holes, would not the only thing you required to do be to put into the pipe a regulator—would not that effect the object at once of regulating the nose-piece?—I think not, because the regulation in the "London" Argand burner is not due to the nose-piece; it is due to the tubes which convey the gas.

Then the regulator in the Argand burner is entirely independent of the burner?—It is more a matter for the consumer. Where the pressure in the house varies at different points, then the regulator is of use; but the "London" burner is a complete burner without the regulator.

Instead of putting in that regulator, if the inlet was partially closed, so as to make it less in area than the aggregate area of combustion, that would have made it a "London" Argand, would it not?—It would be roughly adopting the principles which we find in the "London" Argand.

Re-examined by Mr. CAVE: The turned-over top has no effect whatever on the illuminating power produced by the gas. Before 1869 the advantage of the steatite chamber was not recognized. It was then also supposed that the heating of the gas was an advantage. With regard to the Silber burner, suppose there was an annular ring where those triangular holes are found, there would not be any advantage in having the triangular holes as well.

Mr. *Thomas Arthur Greene*, examined by Mr. WEBSTER.

I am a member of the firm of Henry Greene and Son, and have devoted attention to gas-burners since 1868. I was acquainted with them previous to 1868, but not so much as I have been since. I am acquainted with the "London" burner, and have also seen the Silber burner. I am of opinion that the gas is admitted in Silber's burner through a series of small orifices into the gas-chamber. The chamber of Silber's burner is made of steatite, which is a non-conducting substance, and this keeps the gas cool until it gets to the burning point. There is also a sort of valve, which resembles Mr. Sugg's. The chimney gallery, which carried the chimney, is the same size in Silber's as in Sugg's burner. I have observed that the steatite chamber in Silber's burner is of the same size as Sugg's, and the moveable air-cone which fits Mr. Silber's burner would also fit Mr. Sugg's Trinity burner. All Mr. Silber's Argand burners are marked with a "G," which has been used by Mr. Sugg in connexion with his "London" Argand burner. I cannot tell why Silber's burner should have "G" upon it.

Cross-examined by Mr. ASTON: The steatite chamber has a tendency to keep the gas cool, and this is effected in the "London" burner, as you have been told by other witnesses, by the operation of the steatite chamber. I adopt the more accurate expression that it is the steatite chamber which prevents the heating of the gas, and so keeps it in a cool condition, as employed in Sugg's "London" burner. I have seen the particular burner with the letter "G" upon it. I do not know that the letter "G" stands for "gas" in the burners that are used for gas. I know that there are burners for gas, for paraffin, and other purposes. It would not be contrary to my expectation to find that a man who makes burners for gas and for oil should indicate by letters the purposes for which they are used.

Mr. *Thomas William Keates* was recalled, and minutely described the points of similarity between the Silber burner and Mr. Sugg's burner, stating that they were similar at the very commencement, and extended through the whole burner.

Cross-examined by Mr. ASTON: He thought he might say that the glass chimney had something to do with the low velocity. The glass chimney in the old burner was 7 inches in height, in the new it was only 6 inches.

Re-examined by Mr. WILLIAMS: There were a good many sizes of Sugg's "London" Argand, the chimneys for which would be of different sizes.

[Several burners were then handed to the jury to examine. Upon being asked by his lordship what their opinion was, they stated that there was such a close resemblance it was difficult to tell the difference.]

Mr. *G. W. Stevenson*, recalled, said, in reply to Mr. WEBSTER, that he found in Silber's burner a contrivance, rough, certainly, and ready, but still a contrivance, for limiting the flow of gas into the gas-chamber. Then the steatite gas-chamber screwed into the metal plate with holes larger in the aggregate than he should presume the "B" shaped holes were, all tended to the same result as Sugg's burner—namely, greater economy in the use of gas and a higher illuminating power.

This concluded the plaintiff's case.

THURSDAY, MAY 18.

Mr. ASTON opened the case on behalf of the defendant. He first of all proceeded to address his lordship on the points of law, holding that Sugg's specification was insufficient in two respects—first, in the claim that was made, which was ambiguous. In order to give full effect to the words employed in the claim, his lordship would have to say what was the meaning of "constructing," and what was the meaning of "manufacturing." If they meant the same thing, there was no necessity to put them together; and if they meant different things, then "manufacturing" would refer to the process of manufacture, but not the putting together. Besides that, the patentee went on to say, "and means employed in making." What did that signify? Did it denote the means employed in putting together, which would imply separate parts, or did it refer to the means employed in manufacturing? If it indicated the means employed in manufacturing, then it meant the moulds that were employed in the improvement in manufacturing, which consisted in manufacturing the burners by casting and fixing together the principal parts constructed of metal at one operation; and the entity of the operation, in the case, constituted the essence of the invention.

Justice BLACKBURN asked Mr. Williams if he meant to assert, even supposing it was a separate part of the claim, that the casting of metal into moulds was new.

Mr. WILLIAMS said he did not; and he ought to add, perhaps, that the use of this composition of soft metal, although not a new composition, nor a new thing to be cast into moulds, was, as far regards the burners, a new application, which became possible for the first time.

Justice BLACKBURN said he would reserve that question for the court above.

Mr. ASTON contended that the defining part of the specification was bad. He relied upon the case of *Foxwell v. Bostock*, in which it was held that a patentee was bound to declare what constituted his combination, and if he claimed anything *plus* the combination by way of a subsidiary part, he was bound to indicate what that subsidiary part was. In the case of *Fox v. Stevens*, Lord Justice James had said that if a patentee were driven to look into a mass of information for the purpose of getting at the grain of gold which constituted the invention, the patentee had not kept good faith with the public, in not making a complete statement of his specification.

Justice BLACKBURN said it would be a question for the jury whether, reading the description in the specification, a man of competent skill, with a knowledge of what gas-burners were at the time, would be enabled to make the burner work as Mr. Sugg had made it work.

Mr. ASTON said his next point was, that it was not good subject-matter for a patent.

Justice BLACKBURN: I am quite clear it is not a good subject-matter simply if you say, "I have discovered a method of burning gas at a low velocity;" but I think when a man says, "I have discovered that which nobody ever invented before, and I show a good mode of doing it," then that is a subject-matter for a patent.

Mr. ASTON: Does your lordship take it that the application of casting is not good subject-matter?

Justice BLACKBURN: I think the application of casting is not a new matter.

Mr. ASTON: There is also this, that inasmuch as it appears from the evidence that a considerable portion of what is claimed for the Argand burner was at least done for the flat-flame burner, the application to the Argand burner of what was done to the flat-flame is not subject-matter.

Justice BLACKBURN: Unless the nature of the thing is such that its application to the Argand burner produces a new and beneficial effect.

Mr. ASTON: Your lordship rules against me on that point?

Justice BLACKBURN: Certainly. If it is not a subject-matter for invention, I do not know that the reserving makes any difference.

Mr. ASTON: No; but in the case of *M'Intosh v. Birnie* I asked your lordship to say whether it should be or not; and I now ask your lordship kindly to do the same.

Justice BLACKBURN: There is no harm that I can see.

Mr. WILLIAMS: No harm; we cannot alter the facts upon it.

Mr. ASTON: Now as to infringement. As a matter of form I must ask your lordship to direct the jury that, as far as the case has gone at present, there is no evidence of infringement.

Justice BLACKBURN: I have heard nothing of infringement in all the evidence.

Mr. ASTON said he did not suppose that his lordship would accede to his request, but he was bound to ask that upon the evidence, as it stood, his lordship should rule the patent was for a combination, and that the only novel feature in the combination was the use of three conducting channels, instead of two, for the purpose of cooling and restricting the flow of gas to the gas-chamber.

If it was so, he contended that there was no evidence of infringement, if that was the proper construction of the specification that should be presented to the jury.

Justice BLACKBURN: I will say nothing as to what is the infringement, and will give no direction until I have heard all the evidence.

The points of law having been disposed of,

Mr. ASTON then addressed the jury for the defendant. He said that as the plaintiff had withdrawn half of his declaration, that the defendant had infringed his patent of 1868, judgment would be given as to that part for the defendant. He (the learned counsel) did not deny for a single instant the merit of Mr. Sugg as an improver of gas apparatus. His learned friend had thought fit to cast imputations upon Mr. Silber, and dealt with him rather hardly in relation to something connected with the Trinity burner, which would be sufficiently explained; but he would not imitate his friend in this line of conduct. Admitting, as he did, that Mr. Sugg had devoted his time to the improvement of gas-burners, and that the improvement he made by his particular combination was a very great improvement, still he had no right to put his gate across the Queen's highway of progress in order that everybody who passed through must pay toll. He had, in effect, said, "I will have a monopoly of everything which prior to 1869 I found in use, and if I combine it in one practical advantage I will call it a 'London' Argand burner." He could not do that. He must first of all tell the public what it was that constituted his invention, and then they must be perfectly satisfied that he was claiming no more and no less than his combination. In the case of *Clarke v. Adie*, recently decided by the Lords Justices, it was held that if a man claimed a combination consisting entirely of old things, his combination would constitute his invention, and he must tell the public, as Lord Westbury said, in *Foxwell v. Bostock*, that he claims the combination and nothing more than the combination. If, on the other hand, a man claimed a combination, and a new and material part *plus* the combination, he must, in the body of his specification, use words that would indicate very clearly that, in addition to his combination, he claimed something that was subsidiary or subordinate. Mr. Sugg described his patent as "an improvement in gas-burners, and in the method of constructing and manufacturing the same." He (the learned counsel) contended that "method of constructing and manufacturing" was a duplicate claim, and, accordingly, taking that as the title, he should expect to find in the body of the specification a description of what constituted the method of construction, and also a description of what constituted the method of manufacturing; and he thought that these were not indicated in the body of the specification. At page 3, line 23, there were these words: "The improvements consist in the delivery of the gas into the chamber containing the apertures at which admission takes place at a low velocity and at a temperature exceeding that of the surrounding atmosphere as little as possible." What was the point at which the gas must be delivered at a low velocity and a low temperature? Not at the apertures of combustion, but at the inlet aperture. He would contend by-and-by, that the lowering of the velocity and the lowering of the temperature, which was, in fact, claimed as being due to the three small channels with their narrow areas, had nothing to do with the gas-chamber. It would, of course, be impossible to deny that the delivery into the gas-chamber took place at the three several mouths of the three several channels, and that it was by the action of these three several channels that the velocity was to be diminished and the temperature lowered; therefore it must be by something in the sequence of apparatus, antecedent to the throats or mouths of the three channels, where the operation of lowering the velocity and the temperature took place. Mr. Sugg said that that was the effect of "so arranging the sizes and shapes of the tubes or channels and orifices." What were the "tubes or channels?" He (the learned counsel) contended that the three "tubes or channels" described upon the face of the specification were the additions which the patentee made to his stock of knowledge of 1869. The shape was bent, and the size was the size of area, and as one of the witnesses had said, the bent shape was there in order to give increased length and passage, and the small area was there in order to give additional construction beyond the construction due to the old regulating valve, consequently the arranging of the sizes and shapes of the tubes and channels constituted the main features of Mr. Sugg's invention. The specification then went on to say, "Orifices in connexion therewith," but that would refer to the old orifices. Mr. Stevenson said that the orifices in the Sugg-Letheby burner were as large as those in the "London" Argand burner; therefore the orifices were left as they were. Mr. Sugg then proceeded in his specification to deal with the channel, in order to let the atmosphere have access to it from the outside, and then cooling and constriction were the result. He was quite willing to concede the merit to Mr. Sugg, and he would have to ask the jury by-and-by if Mr. Sugg had used it. Not one of the witnesses for the plaintiff had said that there was anything in Mr. Silber's burner which was equivalent to the cooling by the elongation of the bent form of the three tubes. He (the learned counsel) contended that there was no infringement of that, and these three tubes the patentee put forward in the front of his specification as constituting the main element of his combination. He added the orifices, but in the orifices he said that there was nothing new. He made no change, and then he stated the result, "That the gas shall issue at the point of ignition at an inappreciable or the least possible pressure." If that was meant to be anything definite, the patentee ought in fairness to have gone on to say that the ratio of area of inlet and the area of combustion, ought to be 2 to 1, or 3 to 1, or 4 to 1, or whatever it might be. When Mr. Stevenson was called he said that that might be carried too far, and that if in some cases this ratio were adopted the gas-burner would be spoiled. If, then, the patentee claimed something other than the liberty of lowering the velocity, and also the combustion in general, he ought specifically to have stated the proportions; otherwise he had not kept good faith with the public. He would ask the jury to place the same construction which they were disposed fairly to apply to Mr. Sugg's specification upon the three or four prior specifications upon which alone he should rely. The patentee described, in conjunction with them, new bent tubes for constricting and cooling the old orifices, if he went on to say that "This is effected mainly by making the bore at the supply-tubes or channels of such a size that, in the aggregate, the area shall be less than the area of the holes of the chamber or top," putting it that the area of inlet should be less than the area of combustion. Then he introduced parenthetically the words, "In the chamber or top, which is made by preference of steatite, lava, porcelain, or other incorrodible and non-conducting material." In the provisional specification the patentee described his improvements in the same words as those to which he had already called attention—"That the improvement is effected mainly by making the bore of the supply-tubes of such a size that this, or their aggregate area, shall be less than the area of the holes in the chamber, which is made of steatite or porcelain, and from which the gas escapes, and is burned." There the direction was positive. It was to be made of steatite or porcelain, and one would think from that, that the patentee meant that the gas-chamber was to be made of porcelain or steatite, or other analogous material, and that that constituted his invention; but, in his complete specification, he admits as much as that in the interval he had obtained additional knowledge. He believed at that time that steatite burners became well known in the market, and in all probability Mr. Sugg, directly or indirectly, in the interval between the provisional and the complete specification, became aware of this fact, and, with proper caution, introduced the words "by preference." If a patentee claimed anything directly, he must be bound by his claim, but if a patentee described incidentally in the body of his specification things that might be used "by preference," they might or might not be used just as he pleased, and he could not then set up a claim to these as forming an essential part of his combination, and for this reason: if it was an essential part of his combination, he would throw upon the public the necessity of making experiments to ascertain what would do, and what would not do, as was held in the case of *King v. Wheeler* (2nd Barnewell and Alderson, page 345). By reference to the provisional specification, it was clearly indicated that the patentee did not intend to claim the steatite chamber as a material part of his combination. But they had had evidence that the addition of this steatite chamber was that which constituted the improvement on the Sugg-Letheby model, and that the improvement on the Sugg-Letheby model might be measured by increased illumination to the extent of two candles. That increase was entirely taken away if a steatite chamber was substituted for a metal one. Then what followed? The actual thing that caused the improvement was the steatite chamber, not because it cooled, but because its action was negative instead of positive. It did not propagate the heat from the orifice of combustion down the sides of the chamber, and so allow the chamber itself to become heated. The specification went on to say: "There is also an arrangement for regulating the quantity of gas admitted to the steatite chamber by making a nose-piece, adjustable by means of the screw thereon, and paper or other washers, and forming an inverted cone in the inside of the upper part of the inlet-chamber in the burner." This referred to the well-known regulator, applied very frequently to the Sugg-Letheby burner, for the purpose of regulating the supply of gas to the gas chamber, and for all purposes of regulating the supply there was in the Sugg-Letheby burner, precisely what was described as belonging to the Argand, save and except that the two channels were large, and possibly did not restrict the flow of gas, whereas in the Sugg-Letheby the channels were three, and were made expressly long and of small area, in order to restrict the supply and to cool it. What constituted the combination that gave Mr. Sugg the full advantage of all he had set about? It consisted first of a regulator, next of three channels that constricted and cooled the gas, of a steatite chamber and of combustion orifices, having such an area that their area was greater than the area of inlet, and if his friend liked to throw in as a make-weight his air-cone, he was welcome to do so, whether the combination consisted of two parts, namely, lowering the velocity by means of relative area, and cooling by means of the steatite chamber, as some of the witnesses said; whether it consisted of four parts, namely, regulating valve, three channels, cooling and constricting steatite chamber, and orifice of large area as compared with inlet area, or whether it consisted of all these, with the air-cone added, he (Mr. Aston) did not care; because, if it were the first—the combination of the two—then he should ask them at once to find that that combination was not new. If it were the combination *simpliciter* of lowering velocity by having a variable area of combustion as compared with area of inlet, and combining with that steatite chamber for the cooling or prevention of heat, which would arise necessarily from these two in combination, then that was old. Therefore, he was not afraid of the combination. Some of the witnesses had said, "There lies the merit of the invention; there lies the gist and the desideratum supplied by Mr. Sugg." Mr. Sugg took care to embody these two essential elements in his "London" Argand burner, but he did not stop there. In his drawings he added the cone outside, which would make the combination up to five. If Mr. Sugg relied upon these four, and added to that the straight air-cone, which the defendant had not used, he (the defendant) had neither used the five combinations in their entirety, nor the four in their entirety; and if he had used the two in combination, it was because every one, in 1868 and 1869, prior to Mr. Sugg's patent, was perfectly justified in using those two in combination. He would now refer to the specifications of Williamson and Durich. Mr. Williams had admitted that in Williamson's patent there was the broad proposition stated that if the area of inlet were considerably less than the area of combustion, the flow would be arrested, and economy would be the result. He said two things. First, he said, "This man did not tell you anything about illuminating power." To that he would answer, "He gave me the alternative description; he gave me what was a convertible term"—that an improvement would result in the economical use of gas. They would hear from the witnesses that no person could use gas economically without obtaining a better result. Increasing the illuminating power simply meant getting a better light. Therefore it was an error when it was said that Williamson was to be prejudiced, when in his description he did not predicate that the result would be an improvement in illuminating power. And if that was an error on Williamson's part, it was also an error in Mr. Sugg's specification. Mr. Sugg had not stated what the improvement was at all. He had simply said, "Make that combination, and you will get a good result;" but he did not state what the result would be. Applying a fair construction to both Williamson's and Durich's specifications they (the jury) would be satisfied that there were indications given which embodied the principle of Sugg's invention so far as regarded the use of a constricted inlet, and relative size of orifice of combustion to that of inlet. While Williamson did not say anything about illuminating power, he did not say that this regulator must not be applied to an Argand burner. If the question was one of proportion of area of inlet to area of outlet, then clearly Mr. Sugg had no right to ask for a verdict because he had not completed that part of his bargain in telling what the proportion was; and he would ask the jury to put the same construction upon Williamson's specification as they had hitherto put upon Sugg's. He admitted that Williamson did not state in every case what was to be the relative proportion, but he stated what was a very good proportion, namely, two to one, and that that proportion would produce a good result. In the bat's-wing burner there was a relative area producing a good result in the same way. The words used in Durich's and Williamson's specifications would include both the bat's-wing and the Argand; and Mr. Sugg describes his improvements as consisting in the delivery of the gas into the chamber containing the aperture, in the singular number, as well as into the chamber containing the apertures, in the plural; and unless effect was given to the singular number by saying that it referred to the class of burners where there was only one aperture, there would be no effect given at all; and it was necessary to give effect to all parts of a specification. He contended that the words "aperture" or "apertures," which were found in the plaintiff's specification, covered all the variety of burners that were known in 1869, and that it would be equally an infringement to use the constricted area of the inlet in connexion with Mr. Sugg's channels whether applied to a bat's-wing or whether applied to the Silber Argand. The learned counsel then dealt with Durich's specification, contending that any one had a perfect right, in 1868, to use Durich's arrangement of screwing on any then-known burner to one of his gas-pipes; and if that was so, there was no difference between that construction and what Mr. Sugg had claimed. And if that was a common right previous to Mr. Sugg's invention, Mr. Silber had a perfect right to use it since. Mr. Durich's patent was such a clear anticipation of Mr. Sugg's patent that he could not have made a claim in the terms he had done. Another point he would urge was that Mr. Sugg's prior specification of 1866 was an anticipation of his patent in 1868, and would be just as much fatal to the validity of his patent as the specification of anybody else; and therefore it was that he took exception to the course adopted by his learned friend in holding up the gas-burner and saying that it had been infringed. Referring to Williamson's specification, he said that taking the construction of the words applying to this patent, any one had a perfect right to apply to an Argand burner the constriction of inlet area as compared with the enlargement of consumption area, because Williamson had stated that it would be attended with beneficial results. The combination in Williamson's patent was a regulating cock or valve, holes of inlet, smaller than holes of combustion, and there was only another thing wanted to make what many of the witnesses called the "London" Argand burner, namely, a steatite chamber instead of the metal chamber. Every one knew that metal was substituted for steatite before 1869; for Mr. Sugg himself could not deny that, prior to that year, he made some of these steatite

chambers, and Mr. Stevenson had said the same thing. He (the learned counsel) would prove by actual sale and delivery that it was publicly known to the world at large that steatite chambers might be bought and sold, and used in place of metal chambers in connexion with gas-burners. Seeing that Williamson's combination was the same as used by Mr. Silber, the plaintiff could not succeed in establishing a case of infringement against Mr. Silber, unless it was found in the Silber burner he had actually adopted that which Mr. Sugg had adopted, *plus* the Williamson burner, which was the channels by which he constricted and cooled the gas. He should call witnesses to show what were the holes found in Williamson's specification, and they would state that for all purposes of gas-burning the holes that were found in Williamson's burner, for the purpose of constricting the inlet aperture, were precisely the same as those used by Mr. Silber. Williamson, in the concluding words of his specification, said, "I would remark that the means of checking or interrupting the direct flow of the gas between the comparatively small area of inlet and the comparatively large outlet of the gas-burner may, according to my invention, be varied." And he also said "that other means of checking might be used, such as impeding substances composed of fibrous materials, or anything else which would cause the gas to go in and out and so impede its flow." He then went on to say, "At the same time I would remark that I make no claim to the use of such or either means of checking the direct flow of the gas between the inlet and outlet passages of the gas-burner whether the inlet passages to such burner are of a larger section of area than the outlet;" therefore Williamson, in the broadest manner, indicated that in the use of a constricted area of inlet or aperture, with an enlarged area of combustion, there was a great advantage, which arose from the diminishing of the back pressure of the combustion orifice, and which resulted in economy, and therefore in increased illuminating power. That being so, what was it that Mr. Silber had done? It was admitted that Mr. Silber had, in his burner, used certain parts of combination which were found in the Sugg burner, but he should ask his lordship to decide whether or no those parts of the Sugg burner which Silber had adopted were not found in combination in the Williamson and in the Durich burner. Mr. Sugg had adopted the regulating cock or valve, so had Mr. Silber, so had Williamson, and so had Durich. He had taken, in connexion with that, the inlet chamber, in which were triangular passages, and he admitted that in some of those cases it appeared that the triangular passages were forced down by accident upon the base-plate, and that the area of inlet was less than the area at the holes of combustion. But this was only Williamson's second point in combination. Just as Williamson used his small holes in connexion with his regulator, so Silber had used his small holes in connexion with his regulator. There was also in the Silber burner an ordinary chamber such as Williamson described in his specification, and whatever was ordinary in Williamson's time, before the date of the patent of 1869, was public property, and any one had a right to use it. In the Silber burner, there was also a regulating valve, holes of emission smaller in area than holes of combustion, and there was an ordinary chamber, just as in Williamson's. What was it that the plaintiff complained of? He complained that Mr. Silber had an air cone, but he did not think his learned friend would contend that the straight air cone was a part of the combination of the "London" Argand, but if he made his combination consist of five parts, *à fortiori*, Mr. Silber had not adopted it if he only employed four parts, for those four were found in the same relative combination in the Williamson burner; and unless they were satisfied that Williamson, by the words of his specification, excluded the Argand burner, it would be impossible for them to find that Mr. Silber infringed the patent of Mr. Sugg, because he only used in combination those parts which were adopted before the date of Mr. Sugg's patent. It had been asked, what was the use of those triangular passages if they were not for the purpose of constricting? The answer to that was very simple. It was well known that there were many ways of distributing, of squandering, gas in its passage from the gas supply-pipe to the burner, because it was not advisable that a column of gas should move at the rate of some 7 or 8 feet a second. If the gas were to go in a column, as it were, against the burner, instead of being distributed in streams, there would not be that equable combustion which it was desirable to have, in order to produce a steady flame. Seeing that the gas could be squandered in a variety of ways, Mr. Sugg could not claim as an invention the making of three tubes where there were two before. Instead of having a squandering operation performed by anything interposed in the tube, it might be done in the base of the gas-chamber itself. That was not what Mr. Sugg had done. He distributed it by three channels before it got to the gas-chamber, strangling and constricting it at the throats of those passages. Mr. Silber had said, "You are wrong there; that is not a good way of distributing. I will distribute it by an inverted dish, which I will place at the bottom of my gas-chamber;" and the triangular apertures in the dish, or inverted chamber, represented the apertures which were used for distributing gas all round the gas-chamber, and it was for that purpose alone. If the relative areas, or some of the areas, was the question to enter into in relation to the consideration of Silber's burners, would he have made a triangle more or less deep, and more or less open, or would he have made some large and some small, or would he have taken the trouble to be quite sure, in all cases of construction, that the solder used in the base-plate should not prevent the dish occasionally coming down upon the base-plate, and so leaving an annular space all round? He would not have taken care to do that. It was utterly unimportant for the purpose of ensuring that Mr. Silber's gas should burn well or give illuminating power, whether there were seven triangular apertures or five, or whether they pressed upon the base-plate, because under all these circumstances there was an equal distribution of the column of gas by which it was divided into separate streams, which went up to the gas-chamber, and each one conducted to the combustion holes, which stream in its due order produced equal velocity of pressure and illuminating power. How did Mr. Silber act when his gas blew? Just the same as other people would do; he turned off the cock, and that was all that it was necessary for anybody to do who had a good burner, and wanted to make it burn well. Mr. Silber had the old regulating valve in connexion with the old Sugg burner, and he said, "Turn the milled head of that regulating valve, and you will more or less prevent blowing." Mr. Silber also held that it was by the particular arrangement of his passages, by the equal distribution inside the gas-chamber—not outside, as in Mr. Sugg's patent—that the favourable results were produced. What was there in Mr. Sugg's specification or claim to prevent Mr. Silber doing that? Mr. Sugg in his claim had said: "Having now described the mode and particularly set forth the nature of this invention and the mode of manufacturing the improved burner, I would observe, in conclusion, that I do not confine or restrict myself to the precise details described or referred to, as variations may be made without deviating from the general method by which those improvements are produced." What was this except these constricting and cooling channels superadded to the old combination? What did the word "manufacturing" mean? It meant something which he believed his learned friend would find it hard to deal with. "And means employed for making gas-burners." What did that mean? He must confess that these words puzzled him. The plaintiff must be confined throughout to his combination of three or four or five parts, as these must be the means employed. The jury ought to ask themselves the question, as men of sense, holding the balance fairly between a meritorious patentee on the one hand and a rival manufacturer on the other, whether the means employed, which the patentee had described, were not a combination of three, or a combination of four, or a combination of five. He was certain that neither of these combinations could be found in the Silber burner; and upon this point he should ask their verdict, upon infringement as well as upon novelty. A cloud of imputation was intended to be thrown upon Mr. Silber, because he made use of the letter "G;" but it was the practice of Mr. Silber, in the course of trade, to mark all his burners by consecutive numbers, and the stamping of the letter "G" on the burner in question was a mere accident. The main point to be tried was whether Mr. Silber was a fair or unfair trader, or whether in his proceedings he had done that which would cast a cloud of suspicion on him. Had Mr. Silber taken what was described in Mr. Sugg's specification, and had Mr. Sugg, in what he had claimed and described in his specification, claimed and described what was old?

Mr. *John Imray*, examined by Mr. Aston.

I am a member of the Institution of Civil Engineers, and have carried on business for many years as a practical manufacturer of machinery. I assisted, between 1842 and 1849, in the heating, lighting, and ventilating arrangements of the Houses of Parliament. I have read the specification of Mr. Sugg's patent of 1869. The claim includes three points, the constructing, manufacturing, and means employed in making gas-burners. Among mechanicians the ordinary meaning of the word "constructing" would be the putting the parts together in a certain order to produce a certain effect. The meaning of the word "manufacturing" would be the method by which the parts are put together, as opposed to construction, which means the design by which the things are to be put together. Assuming the word "constructing" means what I say it does, the parts described in this specification of Sugg, which are constructed or put together, are a socket of soft metal, three bent tubes, an upper socket of soft metal, and a steatite chamber put into that. Those mechanical parts are all cast into one piece, except the burner. I have examined the construction of the parts forming the Silber burner, the parts of which differ, and are not put together in the same way. Irrespective of the mode of construction, assuming that the Argand burner consists of four parts—the valve for regulating, the three conducting channels of small area, the gas-chamber itself, made of steatite or other material, and the holes at the point of combustion—these are not found in the Silber burner. There are no bent tubes in the latter burner, and this is a peculiarity of the Sugg burner. The process of Sugg's manufacture in the specification relates only to the mode of joining together the bent tubes, which are the sole agents described by Mr. Sugg for accomplishing the results obtained by his burner. The specification would include, in my opinion, all kinds of burners. The claim and the definition, according to my judgment, would include the bat's-wing burner, the fishtail burner, the Argand, and the plain jet. According to the drawings, the proportion of velocity in the bent tubes would be eight times as great as the velocity at the point of ignition. I find that the bent tubes are, as nearly as I can see, the same size as the holes of ignition; there are 24 holes of ignition and three tubes, therefore the area of ignition would be eight times the area of the receiving-tubes. I would understand that the words "by preference" in the specification would mean that the chamber could either be made of metal or steatite. The heat generated at the point of combustion would not generate along the walls of the chamber, considering the rate at which the gas was running through the pipe, and especially considering the non-conducting nature of the material employed in the construction of the gas-chamber. I heard part of Mr. Stevenson's evidence, and assuming it to be true, as stated by Mr. Evans, that if the steatite chamber of a "London" Argand be replaced by a metallic chamber, and the illuminating power reduced by two candles, it would undoubtedly cease to have the attributes of the "London" Argand burner as ascribed to it by Mr. Sugg. It would cease to be an improvement of the Sugg-Letheby burner. It is not known now that reducing the temperature is an improvement. Whether the gas passed through a steatite chamber or a metallic chamber, there would not be any appreciable difference between the temperature of the two. The rapidity of the passage of the gas would not allow the heat to operate. In the Silber burner there is nothing specially directed to the cooling of the gas. The passage is the ordinary supply passage, and the gas will be cooled as it has always been cooled before Mr. Sugg's invention. There is nothing in Mr. Durich's specification that would not include all kinds of burners. An Argand burner might have the same sized nozzle as a bat's-wing. An ordinary steatite burner could have been screwed on to the constricting apparatus mentioned in Durich's specification. There is no substantial difference between the regulator and the distributor in Williamson's burner and Silber's burner. Assuming a steatite burner was an ordinary burner, anybody could screw it on to Williamson's apparatus, and in the action and results it would not be different from Silber's burner; it would only be different in shape.

Assuming that Sugg's claim includes Silber, would it also include Williamson? Yes; if his claim includes Silber without the bent tubes, it certainly would include Williamson.

Examination resumed: This burner [produced], which is constructed under the provisional specification of Duff, has a constricting valve similar to that in the Silber, and the distributing result is the same. There is nothing in Duff's or Williamson's specification to confine it to bat's-wing or flat burners. It refers to gas-burners generally, and includes Arganda. There would be a combination of restricting valve, distributing apertures, steatite chamber, orifice of combustion larger than the inlet, by applying the ordinary steatite burner to the apparatus which Duff said was applicable to all burners. There are the same means of regulating the passage of the gas, *plus* self-adjusting apparatus, as there are in Silber's. [Witness was handed one of the Silber burners, which had been cut open. He pressed the cap as hard as he could on to the bottom of the tube, and found that he could put three thicknesses of brief paper between them, and there was no impression on the paper.] I conclude that in that burner there is an annular passage round the triangular aperture, and it must have been larger when it was soldered together, because there is some thickness of solder round the outer tube. The annular passage served as an inlet area. Its area is ·0481 inch. I do not think it would make the slightest difference whether the inlet area of Mr. Silber's burner was larger or smaller than the area at the point of combustion.

Cross-examined by Mr. Williams: I have practised as a patent agent for six years, and was engaged by Mr. Silber in the present case to report upon the burner, and to get up evidence; but previous to that I did not know anything about the subject. I have been consulted a good deal by gas engineers from 1850 down to 1868, but I never made any experiments in relation to gas-burners. I have never tested them during that time, but I have seen them tested. I have seen the holes in Argand burners of all sizes, and in former times it was thought that the smaller the holes at the point of combustion the better. I do not think the Sugg-Letheby burner was a step in advance in gas-burners. An advance in illuminating power of 2 candles might be obtained under certain circumstances. I saw Sugg's "London" burner first in 1870 or 1871. I have heard that it was an improvement in gas-burners, but I have never tested it. The only distinction between the flat-flame and the Argand burner is that the flat-flame has to be burned at a higher pressure. I think that gas could be burned with a flat-flame burner at as low a pressure as in an Argand, but the difficulty is the mechanical one of making the slit fine enough. By ascertaining the velocity I can ascertain the pressure that caused the velocity.

(*To be continued.*)

Normanton Sewerage.—Lieutenant-Colonel Cox, R.E., has recently held a local board inquiry at Normanton, for the purpose of obtaining information as to the proposed expenditure of £30,000 for water supply, sewerage, drainage, &c., at that place. It was stated that for the sewage it was proposed to buy 11 acres of land, and the water was proposed to be sold at 1s. to 1s. 6d. per 1000 gallons.

Beccles Water and Gas Company.—The annual general meeting of the shareholders was held on the 24th inst., when the report of the directors and the capital and profit and loss accounts were read and adopted, and it was resolved that a dividend of 5 per cent. be declared and paid immediately, and that the sum of £296 4s. 6d. be appropriated in payment of the balance of the cost of the new gasholder and governor.

Miscellaneous News.

METROPOLIS GAS SUPPLY.

METROPOLITAN BOARD OF WORKS.

At the Meeting of the Board on Friday last—Mr. H. L. TAYLOR in the chair, The Parliamentary Committee brought up the following report:—

Your committee have to report that the decision arrived at by the Board on Friday last, with respect to the London, Phœnix and Surrey Consumers Gas Companies, having been communicated to the Board of Trade, a letter has since been received from that department to the following effect:—

1. The Board of Trade concurs in the proposal that in the event of the companies applying for power to acquire more land, this Board should have the right to call evidence before the Board of Trade in support of any objections which it may be necessary to offer to the companies proposals.

2. The Board of Trade still considers it desirable that the bill to give effect to the proposed arrangement should be introduced by that department, instead of the Board's bill, now before the House of Commons, being amended for the purpose.

3. The Board of Trade suggests that the question of the reserve-funds of the London and Surrey Consumers Gas Companies should be postponed until the proposals of the companies are embodied in the bill.

Your committee have directed the Board of Trade to be informed that this Board will be ready to consider any bill which may be prepared by the Board of Trade, and submitted to the Board for consideration, but that until such bill shall have been agreed upon, the Board does not think it advisable to withdraw the Metropolis Gas Bill from the consideration of Parliament; and with respect to the reserve-funds of the London and Surrey Consumers Companies, that the Board sees no reason to depart from the decision communicated to the Board of Trade as directed by the Board on the 19th inst.

Mr. ROCHE moved the adoption of the report. He said the Board of Trade, having stated that they had instructed their parliamentary agent to prepare a bill to carry out the proposals in reference to the three companies, it was impossible, under those circumstances, for this Board to say that they would not look at that bill, and they would have to do it with great care and much consideration. The committee therefore recommended that the Board should keep alive their own bill until they had the opportunity of deciding whether the bill the Board of Trade were having prepared, carried out the objects they had in view.

Mr. DRESSER ROGERS said he was very pleased to find that the Parliamentary Committee had recommended the Board to persevere with their own bill, because he was at a loss to understand why a public department like the Board of Trade should interfere with the proceedings of this Board, which had already spent a large sum of money in connexion with the gas question. This Board, if they meant to settle the matter satisfactorily, could only agree to a bill containing the same provisions as their own bill. But he found, from the report of the committee, that the Board of Trade did not accept the conclusions which this Board, upon the recommendation of their committee, had adopted in reference to the extraordinary proposal of the Surrey Consumers and London Gas Companies, that they should have power to make up their reserve-funds, the effect of which would be that the sliding scale in their cases could not come into operation for two years. It appeared to him a most extraordinary thing that the Board of Trade should desire to bring in a bill of their own. A select committee of the House of Commons had just decided, after a severe contest, that the South Metropolitan Company's district, which, as far as Camberwell was concerned, he (Mr. Rogers) represented, should have the initial price of gas fixed at 3s. 6d., and he was therefore at a loss to understand why the Parliamentary committee, or the Board of Trade, should think of going on with a bill which, if carried, would give a 3s. 9d. initial price in all other parts of south London. He did not desire to oppose the committee, and he knew the all-powerful influence of the Board of Trade, but he trusted this Board would take steps to obtain a *locus standi*, so that they might watch the progress of any measure introduced by that department. He could not help thinking that if the parliamentary agent mentioned by the Board of Trade should happen to be a director of the London Gas Company, they might find some provisions in the bill which would not be in accordance with the objects sought in their own bill.

Mr. FOWLER said the district which he represented would be considerably affected by whatever bill might be brought in by the Board of Trade. By the proposal of that department of the Government, all the legislation which this Board had initiated was put on one side. It seemed to him very lamentable that, after they had laid down some great principles for the supply of gas to the whole Metropolis, a bill should be brought into Parliament by the Board of Trade, excepting certain companies on the south side of the Thames from the conditions which had already been accepted by the companies on the north side. However, they must now wait until the Government bill was prepared, and the committee had had the opportunity of considering it. Then would be the proper time to make some observation on the question, and he would only now say that he was sure there would be great dissatisfaction at the proposal on the other side of the Thames to place them in a worse position than the consumers of gas on the north side.

Mr. RICHARDSON said the report of the Parliamentary Committee was dated the 23rd of May. Since then quite a different arrangement had been come to in a committee of the House of Commons in reference to the South Metropolitan Company, and he much doubted whether a committee of this Board would have brought up such a report if they had known what they now knew of the decision in respect to that company. It altered the whole face of matters, and he confessed he was surprised to hear Mr. Dresser Rogers and Mr. Fowler say that they approved of the report.

Mr. DRESSER ROGERS said he did not make such a statement.

Mr. RICHARDSON said both Mr. Rogers and Mr. Fowler stated that they would recommend the Board's bill to be continued.

Mr. FOWLER said what he stated was that he approved the course which the committee had taken—*i.e.*, to wait until the Government bill was in their hands before passing judgment upon it.

Mr. RICHARDSON said the bill of the Board proposed to make the price of gas 3s. 9d. throughout the Metropolis, whereas the bill just passed by the committee of the House of Commons fixed it at 3s. 6d. for the South Metropolitan Company. He asserted that it was impossible after that for the Board, with any show of consistency, to maintain their own bill, and that it ought at once to be withdrawn. It was no longer a metropolitan bill. In his district the local board had determined to oppose it. They were now paying 3s. 6d. only, and they saw no reason why they should be called upon to pay more. He was at a loss to understand upon what principle this Board, which represented the whole Metropolis, could now consent to fix a 3s. 9d. price upon the consumers. But, in his opinion, their bill was gone, and they could not possibly do anything further with it. The report ought to be sent back to the committee, with instructions to them to consider the provisions of the South Metropolitan Bill, and to obtain other terms than those contained in the Board's bill.

The report was then adopted.

METROPOLIS WATER SUPPLY.

Major Bolton reports that the water in the river Thames at Hampton, Molesey and Sunbury (where the intakes of the West Middlesex, Grand Junction, Southwark and Vauxhall, Lambeth, Chelsea, and East London Companies are situated), was in a turbid condition during the first half of April (causing the water to be slightly stained), after which it improved and became clear for the remainder of the month. The highest flood state of the river was 2 feet above the (6 feet) summer level, and the lowest was 8 inches above summer level. The highest temperature of the water taken at Seething Wells was 68°, and the lowest 42°, while the highest temperature of the air at the same place was 63°, and the lowest 37°. The condition of the water in the river was indifferent on 9, and bad on 21 days. These observations were made daily at 9 a.m. The rainfall for the month was 2·03 inches.

THE AVERAGE METER SYSTEM FOR PUBLIC LAMPS IN LONDON.

Mr. G. H. STAYTON, the Surveyor to the Vestry of Chelsea, has just presented the following report upon the question of the desirability of introducing the average meter system of public lighting:—

To the Chairman and Members of the Gas and Water Sub-Committee.

Gentlemen,—I have to offer an apology for the delay which has occurred in presenting this report for your consideration; but the business of this department has been so heavy of late, that it has been utterly impossible for me to do so until now. I may, however, state that, in the meantime, the subject has received my best attention; and, having made considerable inquiries thereon, I believe, from the observations hereinafter made, that the delay will be found to have been beneficial.

The average meter system, as adopted in the parishes of St. Pancras and Paddington (by which one meter is placed to every twelfth lamp), has been in operation since Oct. 1, 1874, and, from the reports of the first year's working, I am enabled to briefly place before you some of the results obtained.

	St. Pancras.	Paddington.
Number of lamps	3501	1719
Hours per annum during which each lamp was burning (old system)	4319	4260
Hours per annum during which each lamp burns (new system)	3872	3851
Estimated consumption per hour (old system)	5 cubic feet.	5 cubic feet.
" " " (new system)	4·60 "	5 "
Actual consumption per hour, as ascertained by meter indication	4·47 "	4·83 "
Cost of adoption of system	£3226	£1845
Annual saving effected by modified hours and meter indication, as above	£2278	£622

With reference to the large annual saving thus effected in the parish of St. Pancras, I would observe that it appears to be nearly wholly due to a reduction in the hours of lighting, and in the substitution of a smaller burner, such reductions being entirely independent of the average meter system; and it is evident that the amount named is not "saved by the meter system," as stated in the committee's report.

I would here state that the Imperial Gas Company have issued a memorandum on each of the annual reports referred to, in which they state that a larger sum could have been saved, without incurring the outlay, by simply arranging with the company for a smaller supply of gas. The company also show that in St. Pancras parish there is an actual loss against the average meter system of £324, and in Paddington parish £166; but the company go beyond this, as they have appealed to the gas referees against the actual registry of the meters, which, they allege, "is not to the full extent of the gas consumed at the unmetered lamps, in consequence of the flow of gas to the burners being intercepted by the meters." Should the company sustain their allegation, the above-named loss in the former parish will be increased to £710, and in the latter to £424.

From the above observations, I think your committee will agree with me, that the statement in the reports referred to, that a large saving has been effected by the adoption of the meter system, is, to say the least, misleading. As I have already shown, a very considerable economy has been effected in the consumption by reducing the hours; but the actual saving by meter indication alone (even if the gas company are unsuccessful in their appeal to the referees) is comparatively trifling, and certainly does not appear to justify a large outlay—*e.g.*, in Paddington, the meters saved £257 throughout the year; but the cost of providing them amounted to £1845, the usual annual proportion of which cost alone is £184 10s., independently of lighting, repairs, &c.

In support of the views of the Imperial Gas Company, in reference to their appeal, I would here quote from a report of Dr. Whitmore, the medical officer and gas examiner to the Vestry of St. Marylebone, who made various experiments as to the result of what is termed "meter friction," as applied to the average meter system of public lighting. He states: "From the experiments, therefore, it would appear that, although the loss caused by meter friction is by no means so great as has been generally supposed (being equivalent to 2·12 per cent. only), it is sufficient to show that a metered lamp does register a less quantity of gas than is actually burned by an unmetered lamp, and for that reason could not be considered as a strictly equitable estimate of the quantity consumed." Further, I understand that the London Gas Company are about to arrange with the parish of Lambeth for a supply upon the average meter system, but an addition of 2½ per cent. is to be made to the meter indication, as a compensation for the consumption of the unmetered lamps.

I take it that the object of adopting a meter system is to obtain an accurate and reliable record of the consumption of gas, in which case the result cannot fail to be satisfactory to all parties; but I think that your committee will agree with me in saying that the average meter system appears to be a failure in this respect. A perfect system of measurement would require each lamp to be metered, either separately, or by connecting two or three lamps to a large meter; but this would necessarily involve a large outlay.

The following table shows the annual rate paid to the London Gas Company for gas consumed, lighting, extinguishing, cleaning, repairing, and painting the public lamps of this parish:—

For the year 1875, 926 lamps, burning from sunset to sunrise (4306 hours), 5 feet per hour; gas at 3s. 9d. per 1000 cubic feet	£4731	8	6
For the year 1876, 926 lamps, burning from sunset to sunrise (4306 hours), 5 feet per hour; gas at 3s. 6d. per 1000 cubic feet	£4492	11	8

Estimated Cost of adopting the Average Meter System in this Parish, the Lighting Hours being the same as at present.

First Outlay.

No. 77 meters, boxes, &c., fixed complete	£523	12	0
Reinstating paving, cartage, &c.	31	16	0
No. 926 lever cocks and governors, fixed complete	254	13	0
No. 15 lamplighters ladders	9	7	6
No. 15 ditto torches	11	5	0
No. 15 pole extinguishers	1	10	0
No. 140 new stand-pipes	35	0	0
Meters and governors for stock	45	0	0
Testing apparatus, tools, &c.	70	0	0
Glycerine, and other articles	15	0	0
Supervision, preparing and executing scheme	50	0	0
Labour	20	0	0
Advertising, books, maps, &c.	15	0	0
Meter truck and incidentals	16	0	0
	£1098	3	6

Annual Cost.

Repairs to meters	£19	5	0
Painting meters and boxes	5	15	6
Repairs to lever cocks and governors	50	3	2
Repairs, and painting posts and lanterns	138	18	0
Superintendence and clerical work (say)	125	0	0
Wages of lamplighters	773	0	0
Sundries	10	0	0
Allow 10 per cent. upon outlay	110	0	0
	£1232	1	8
Deduct for private lighting (say)	20	0	0
	£1212	1	8
Gas consumed (4306 hours at 5 feet per hour) at 3s. 6d. per 1000 cubic feet	3489	0	0
	£4701	1	8

Estimated Cost of adopting the Average Meter System in this Parish in connexion with Modified Hours and Reduced rate of Consumption as in St. Pancras Parish.

First Outlay.

The same as in the previous estimate—viz.:	£1098	3	6

Annual Cost.

Repairs, painting, lighting, extinguishing, &c., the same as in the previous estimate	£1212	1	8
Gas consumed (3800 hours at 4 feet per hour) at 3s. 6d. per 1000 cubic feet	2463	13	3
	£3675	14	11

With respect to the item of "gas consumed" in the foregoing estimates, I think it is very possible that an annual saving of about £80 might be effected thereon by meter indication (see the first table, where lamps intended to consume 4·60 cubic feet per hour only consume 4·47 cubic feet), but, practically, this would be counterbalanced by the additional charge of 2½ per cent., as claimed by the London Gas Company, upon the ground "that an unmetered lamp consumes more gas than one having a meter attached."

In consideration of the observations contained in this report, I feel justified in urging your committee to pause before committing the parish to the average meter system, as I fail to discover any advantage corresponding with the outlay; and as, practically, nearly all the advantages of meter measurement can be secured without incurring so large an outlay, by periodically and frequently testing the governors and burners, and causing defects to be forthwith rectified, and by arranging with the gas company for the public lighting upon the following basis of modified hours and reduced rate of consumption (which at present afford very ample scope for economy); the adoption of which system I strongly recommend, as I believe it would greatly conduce to the efficient and economical lighting of this parish.

1. Each lamp to be lighted for 3800 hours per annum, according to a table of lighting to be supplied by the vestry, and to consume 4 cubic feet per hour; the vestry providing, fixing, and maintaining new regulators and burners for such purposes.

2. The company to light, extinguish, and clean the lamps as heretofore, the latter being done weekly.

3. The vestry to undertake the painting and repairing of the columns and lanterns.

4. The governors and burners, referred to, to be officially tested by the inspector of the Metropolitan Board of Works in the usual way before being fixed, but frequent testings thereof should also be subsequently made by the vestry when thought desirable, either from observation or from complaint of defective lighting, and, if found defective, proper ones forthwith substituted. In case the company should doubt the accuracy of any regulator, upon giving notice in writing thereof to the surveyor to the vestry, they shall be at liberty to remove and test the same at the vestry-hall, and, in case of dispute with the vestry as to the result, the regulator in question is thereupon to be "officially" tested.

5. The company to name an annual sum at which they will undertake to light, extinguish, and clean each lamp.

The Estimated Cost of adopting the above Improved System of Lighting is as follows, viz.:—

First Outlay.

No. 926 new governors and burners, fixed complete	£185	4	0
Allow for new stand-pipes, lever-cocks, and re-numbering of lamps	75	0	0
Labour	12	0	0
No. 100 governors for stock	17	10	0
Testing apparatus and fittings	65	0	0
Books, maps, forms, and incidentals	25	0	0
Allow for preparation and superintendence of scheme	21	0	0
	£400	14	0

Annual Cost.

Gas company, for lighting, &c., at (say) 15s. per lamp	£694	10	0
Repairs and painting of lamps, at 3s. per lamp	188	18	0
Repairs to regulators, testing, &c., at 1s. per lamp	46	6	0
Allow for superintendence, testing, keeping records, reports, inspection, &c.	75	0	0
Labour	60	0	0
Official testing and incidentals	40	0	0
Allow 10 per cent. upon outlay	40	0	0
	£1094	14	0
Gas consumed (same as last estimate)	2463	13	3
	£3558	7	3
Present cost	£4422	11	8
Proposed cost	3558	8	3
Annual saving	£934	4	5

Kensal New Town.

The vestry are now paying The Gaslight and Coke Company for supply of gas, lighting, cleaning, painting, repairs, &c.—each lamp burning 4300 hours, at 5 cubic feet per hour—gas at 3s. 9d. per 1000 cubic feet—

Thirty-four lamps, at £4 15s. 9d. per lamp	£162	15	6

For the future, I suggest that the hours be reduced to 3800 (the same as the home district), the annual cost of which, according to the company's letter (which see) will be—

Thirty-four lamps, at £4 11s. 3d. per lamp	155	2	6
Annual saving	£7	13	0

Total Annual Saving.

Home district	£934	4	5
Kensal New Town	7	13	0
	£941	17	5

The Gaslight and Coke Company (commonly called the Chartered Gas Co.), Horseferry Road, Westminster, S.W., March 16, 1876.

Kensal New Town.

Dear Sir,—Our charge at the rate of 3s. 9d. per 1000 cubic feet for public lighting for 4300 hours per annum is—

Per lamp per annum	£4	0	9
Lighting, &c.	0	15	0
	£4	15	9

If the number of hours of burning be reduced to 3800, the charge will be—

Gas per lamp per annum	£3	11	3
Lighting, &c.	1	0	0
	£4	11	3

And it will be necessary for you to furnish the company with a table showing the altered hours of burning throughout the year, as instructions to the lamplighters.

Yours truly,

J. O. Phillips, Secretary.

Geo. H. Stayton, Esq., Vestry Hall, King's Road, Chelsea.

In conclusion, I would suggest that, in the face of so large an annual saving, the vestry hereafter consider whether the lighting of the main thoroughfares and other parts of the parish cannot be greatly improved by the erection of about 25 additional lamps, at a cost not exceeding £100 per annum.

I have the honour to be, gentlemen, your obedient servant.

Geo. H. Stayton, C.E., Surveyor to the Vestry.

Vestry Hall, March 21, 1876.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

The Ordinary General Meeting of Shareholders was held at the Offices of the Company, 60, Cornhill, on Tuesday, May 23—Thomas Hughes, Esq., Q.C., in the chair.

The Secretary (Mr. A. Lass) read the notice convening the meeting, and the following report and statements of account were presented:—

The directors have much pleasure in submitting to the shareholders the accounts of the company, for the half year ending Dec. 31, 1875.

These, with the annexed report of the engineer, show the progress of the company.

The directors have to state that the profit for the half year has amounted to £1155 6s. 3½d. and that, after paying the dividend to June 30, 1875, and the interest on loans to Dec. 31, 1875, there remains an available balance of £1682 9s. 11½d., out of which the directors recommend the declaration of a dividend for the half year ending the 31st of December last, at the rate of 5 per cent. per annum.

The new gasholder has been erected on the works at Georgetown, and the additional retort-beds will be completed as speedily as possible.

The directors retiring by rotation are Thomas Hughes, Henry Palfrey Stephenson, and Matthew Whiting, who, being eligible, offer themselves for re-election.

The retiring auditor is James Waddell, who, being eligible, offers himself for re-election.

The dividend will be payable on the 15th of June next.

Engineer's Report.

Gentlemen,—The stock returns, statement of accounts, &c., forwarded from here for the half year ending Dec. 31, 1875, will, I trust, be found correct, and that the half-year's working will meet the approbation of the directors.

During the half year 22 houses have been fitted with 215 lights, additional lights 61, in all 276; 12 public lamps, and one cooking-stove.

The demand for gas is good, the rental showing an increase over the corresponding period of last year, at the rate of 16·4 per cent.

The demand for coke was not good the early part of the half year, consequently, this item will not compare favourably with the corresponding period of last year.

The whole of the buildings, plant, &c., are in a very efficient state; and care is taken to keep them so.

The engineer's bi-monthly report, together with the monthly carbonizing statements, keep the board fully informed as to the working in the several departments.

The additions to capital account for the half year have been for the erection of the new gasholder, a portion of the erection of new retorts, laying a 3-inch main in Duke Street, together with a proportionate amount to be charged for new services.

The new gasholder was commenced in December, and it is now completed.

In conclusion, I would beg to congratulate the board on the favourable rate at which the last cargo of coals was laid down here.

(Signed) E. Blanchett, Engineer and Manager.

Dr. *Balance-Sheet, Dec. 31, 1875.* *Cr.*

Share capital—6200 shares at £5, fully paid up	£31,000	0	0	Fixed plant, mains, and services, as per last account	£29,157	16 0
Debenture bonds	6,400	0	0	Add since expended	3,233	12 11½
Retort renewal-fund account	60	9	3		£32,391	8 11½
Bad debt-fund	72	5	10	Stock in hand	4,200	11 5½
Bills payable	3,895	17	8	Cash at bank and in hand	2,836	4 7
Amounts owing to sundry persons	1,928	7	9	Bills receivable	1,850	0 0
Profit and loss account—net revenue	1,082	9	11½	Amounts owing by sundry persons	3,161	5 5
	£44,439	10	5½		£44,439	10 5½

Revenue Account, Dec. 31, 1875.

Coals and bituminous	£1,055	0	9	Gas and rental of meters	£3,244	12 10
Purifying account	31	19	2½	Residual products and fittings	595	5 7½
Wages account	427	18	5½			
Repair and maintenance of works and plant, &c.	133	19	9			
Salaries	677	5	10			
Rent, rates, and taxes	37	1	8			
Directors and auditors fees	155	5	0			
Trade and general charges	71	19	4			
Bad debts and allowances	94	2	2			
	£2,684	12	2			
Balance, carried to profit and loss—net revenue	1,155	6	3½			
	£3,839	18	5½		£3,839	18 5½

The Chairman: I beg to move the adoption of the report and accounts. We have had a meeting so recently, in which it was my duty to go fully into the affairs of the company, that I do not propose to repeat what I had to say on that occasion. I will merely call the attention of the shareholders very briefly to the balance-sheet and revenue account, by which they will see that the business of the company is in a very satisfactory state indeed. The fixed plant has been increased by a sum of rather more than £3000, which has been necessitated by the extensions and erections at the works, which, I believe, will prove very profitable to the shareholders in the immediate future. The new gasholder and retorts have been completed, and I think the company are in a position to proceed in the most satisfactory manner in the coming time. With respect to the revenue account, a comparison of the present statement with that of the corresponding half of the previous year, shows a balance of £1155, as against £866 on the former period, being an increase of £289. I think that is a sufficient answer to the question raised at the last meeting, as to the expediency of the policy of the reduction in the price of gas adopted by the board. In-

deed, without that reduction, I am quite sure your affairs would not be nearly so satisfactory as they are to-day. The directors have, therefore, to recommend that a dividend at the rate of 5 per cent. per annum be declared, and I think that is quite a fair dividend to pay. It can be paid prudently, and the board do not find it desirable to increase it, although they trust it may be increased shortly. They are also very happy to say that Mr. Quentin Hogg, who is a large planter in Demerara, and probably one of the most important men in the province, has consented to join the board. The great advantage of that to the directors and to the company is, that Mr. Hogg visits Demerara every year, and spends some considerable time in Georgetown. He has a large establishment there, also a large staff to appeal to, whose presence in Georgetown will be of much service to the company. Our works are reported to be in a thoroughly efficient state, and the prospects of our concern generally are very good—better, in fact, than at any previous period of our history. I move the adoption of the report.

Mr. A. Williams seconded the motion, which was put and carried.

The Chairman moved—"That a dividend for the half year ending the 31st of December last be declared at the rate of 5 per cent., free of income-tax, payable on the 15th day of June next."

Mr. H. P. Stephenson seconded the motion, which was carried.

Mr. May said he entirely disagreed with the directors as to the policy and expediency of reducing the price of gas, and doubted whether it would not be injurious to the interests of the shareholders. The company had a valuable concession, and could not be disturbed in its enjoyment. The price of gas by that concession was fixed at 5 dols., equivalent to £1 0s. 10d. sterling, and the company were not required to reduce the price of gas, when the dividends on the capital had not realized on the average more than 4 per cent. per annum. To make so large a reduction in price as 8s. 4d. per 1000 in the present circumstances of the company was uncalled for and prejudicial. It might be said that by the reduction the consumption had been stimulated, and the revenue increased; but were the profits larger? It was said at the last meeting that the reduction had been agreed to, in order to meet the case of those who consumed cocoa-nut oil and paraffin; but his own opinion was that it would have been better to go on at the old rate, irrespective of that circumstance, and that had they done so they would have been in a better position now. In fact, to his mind, the reduction from 5 to 3 dollars was a virtual surrender of their concession, and he would move a resolution to rescind the decision of the directors on that point.

The motion was not seconded.

Mr. Stephenson said the matter referred to by Mr. May was fully discussed at the last meeting of shareholders, and on that occasion he explained the reasons which induced the directors to reduce the price of gas. They found that having commenced at a price, which was thought to be a proper price, the consumption of gas was not so large as they could wish, and that unless they made a reduction, the consumption would not extend so as to make the concern a success. It was true they took power, in the concession, to charge up to a certain point; but they did not pledge themselves to keep up to the maximum. They could not tell at first what would be a proper price to charge, and it was only by degrees that they came to understand what was the right course to adopt. On the last occasion he gave particulars of the increased consumption of gas that had taken place consequent upon the reduction, and he then stated what was known to all gasmen as a fact, that wherever the price of gas was reduced the consumption was almost invariably largely extended. It was at one time supposed, even in the Metropolis, that it was necessary to keep up the price in order to secure the dividends; but the effect of the introduction of competition was to compel the companies to reduce the price, and then all of a sudden the companies woke up and found that they were making larger dividends. Formerly, with gas at 7s. or 8s. per 1000, they found it impossible to do so; and now, with the price reduced to 3s. 6d., and even 3s., they were paying full dividends on all their shares. He was sorry their friend Mr. May was not a little more patient. He (Mr. May) referred to the Bombay Company. True, that company were paying 7½ per cent. dividends, putting aside something to reserve, and writing off something for depreciation. But then they had been working for 12 or 14 years, whereas it was only just three years since this company lighted up Georgetown. They were charging for wear and tear in their accounts, were putting down a sum for bad debts account, were paying 5 per cent. dividends, and carrying forward a small sum. This, surely, was not a state of things to be complained of. Gas companies must have time given them to develop their rental; it was impossible to create it all at once; and the fittings could only be put up by degrees. He could only assure Mr. May that there was no occult influence, as he seemed to suppose, influencing the board in what they had done. They believed that the effect of the reduction of price would be in the interests of themselves and the shareholders at large, by causing an increased rental, and a corresponding increased profit. If Mr. May would exercise a little patience and some little trust and confidence in the board, who had the advantage of experience to guide them, he would find his investment turn out well.

Mr. A. Williams proposed the re-election of the retiring directors, which was seconded by Mr. Blyth, and carried unanimously.

On the motion of the Chairman, seconded by Mr. A. Clarke, the retiring auditor, Mr. Waddell, was also re-elected.

Mr. Stephenson moved, and Mr. Clarke seconded, that the election of Mr. Quentin Hogg by the directors to a seat at the board be confirmed, which was at once agreed to.

Mr. Stokes moved, and Mr. R. King seconded, a vote of thanks to the directors, which was carried unanimously, and

The Chairman having briefly acknowledged the compliment, the proceedings terminated.

BOMBAY GAS COMPANY, LIMITED.

The Ordinary Meeting of Shareholders was held at the Office of the Company, Great Winchester Street, London, on Thursday, May 25—D. T. Evans, Esq., in the chair.

The Secretary (Mr. W. Marshall) having read the notice of meeting, the seal was affixed to the register, and the following report and statements of account presented:—

Your directors have pleasure in submitting to the shareholders a statement of accounts duly audited, for the half year ending the 31st of December last.

The condition of the company continues satisfactory. The gas and meter rental shows an increase of £878 14s. 7d.; but there is a decrease of £186 9s. 11d. in the sale of coke. The fittings account shows an increase of profit of £610 13s. 3d.; and the trade and general charges show a slight reduction.

Your directors, availing themselves of the low rates of freight and falling prices of coal, have added materially to the stock at the works and afloat, which must operate favourably hereafter.

It will, no doubt, have been observed by most of the shareholders that the exchange between India and this country, has fallen to an extent altogether unprecedented; and as the loss on remittances home during the current year must be unusually severe, your directors have deemed it expedient to charge profit and loss on account of exchange £1200 this half year, against £600 so appropriated last half year.

The manager reports that the erection of the 750 new lamps, and the laying of 20 miles of additional mains required for the same, are in a forward state, and will be completed before the 1st of July.

The accounts show a net profit of £11,762 16s. 8d., and, after appropriating £2000 to the reserve-fund, and writing off from the same £296 7s. 8d. for depreciation, &c., (raising the reserve-fund to £7904 16s. 9d.), your directors recommend the shareholders to declare a dividend of 4 per cent. for the half year, free of income-tax, making 7½ per cent. for the year. This will absorb £9600, leaving a balance of £472 13s. 5d. to be carried forward to the credit of next half year.

The board think it due to their manager, Mr. Scott, to state here that the authorities in Bombay have conveyed to him their thanks for the able manner in which he carried out the illuminations on the occasion of the Prince of Wales's visit; and your directors with pleasure make this recognition of their high appreciation of the zeal and energy he displayed in the performance of that duty.

The directors who retire by rotation are Daniel Thomas Evans and William Fletcher Gordon, who, being eligible, offer themselves for re-election. The auditors, Edward George Bradley and Robert King, retire from office, and, being eligible, offer themselves for re-election.

The dividend will be payable on and after the 1st of June next.

Dr. *General Balance-Sheet, Dec. 31, 1875.* *Cr.*

Capital authorized— (50,000 shares, at £5 each—£250,000.)				Construction account		£197,044 18 10
40,000 shares, £5 paid	£200,000	0	0	Added this half year	39	13 7
10,000 „ £4 paid	40,000	0	0		£197,084	12 5
Debentures	14,850	0	0	Less written off preliminary expenses account	200	0 0
Amount owing by the company	9,071	13	6		£196,884	12 5
Reserve-fund £6,201 4 5				Goods *in transitu*	4,280	5 1
Added this half year 2,000 0 0				Retort account	977	3 10
	£8,201	4	5	Stock in trade, viz.—		
Written off for depreciation & from preliminary expenses 296 7 8				Chandeliers, Brackets, &c.	5,899	8 5
	7,904	16	9	Brass and iron goods, tubing, &c.	6,090	7 9
Exchange equalization account	461	19	6	Materials, mains, and services	5,024	15 6
Insurance-fund	1,293	3	10	Meters	2,497	1 10
Passage-fund	463	17	11	Coal	19,421	14 7
Balance to general revenue account	10,072	13	5	Coke	1,401	15 9
				Tar	160	1 6
				Tools and sundries	750	17 11
				Amount owing to the company	5,999	14 7
				Cash at bankers, on deposit, and in hand	34,730	5 9
	£284,118	4	11		£284,118	4 11

Profit and Loss Account, for the Half Year ending Dec. 31, 1875.

Coal carbonized	£7,735	3	4	Gas and meter rental	£20,734	12 0
Wages	1,120	14	7	Coke	3,223	13 4
Purifying	12	0	0	Tar	638	4 11
Maintenance of retorts	244	5	10	Fittings	876	5 3
Trade and general charges	1,011	11	8	Interest	451	10 8
Salaries and collectors commission	1,652	14	3	Transfer fees, &c.	17	18 4
Rents, rates, and taxes	342	19	9			
Directors and auditors remuneration	626	5	0			
Bad debts	35	12	11			
Law expenses	48	0	6			
Exchange account	1,200	0	0			
Passage account	150	0	0			
Net profit	11,762	16	8			
	£25,942	4	6		£25,942	4 6

General Revenue Account, Dec. 31, 1875.

Dividend for half year ending June 30, 1875	£8,400	0	0	Balance, June 30, 1875	£9,155	6 9
Interest on debentures	445	10	0	Net profit for half year ending Dec. 31, 1875	11,762	16 8
Amount carried to reserve-fund	2,000	0	0		£20,918	3 5
Balance carried down	10,072	13	5	1876, Jan. 1.—By Balance brought down	£10,072	13 5
	£20,918	3	5			

The Chairman: Gentlemen, the report and statements of accounts circulated amongst you have put you substantially in possession of the material facts affecting the company, and show its position at the present time. I am happy to congratulate you upon the fact that the state of the company is sound and satisfactory, although its progress is not so rapid as I could have wished. Before I refer to the balance-sheet, according to custom, I will call your attention to this fact, that the increase in the profit on gas and fittings for the last half year was £1488. Deducting from that a decrease of £186 in the sale of coke, leaves a net increase of profit of £1302, while the trade and general charges—wages, salaries, &c.—were £280 less. Adding the two last items together gives us £1582 to the good. Now, if you refer to the general balance-sheet, you will find on the credit side that goods in transit show an increase of £3938. This is due to shipments of coals and mains. On materials, mains, and services, there is an increase of £3492. This is due to the shipment of mains, lamp-posts, and services—20 miles of mains, and 750 lamp-posts—which we have to provide under our new contract with the Municipality, which contract gives us monopoly of supply of gas to the public lights for 14 years from July 1 next. The next item I call your attention to is coals, which shows a reduction of £4553. This is due to working down the stock. But we have increased that now by £3182; because the cost of freight having fallen so low, we have been making very large shipments, chiefly from Australia. Cash at bankers, on deposit, and in hand, amounted to £34,730, which is an increase of £5055. I think I cautioned you at the last meeting not to run away with the notion that this large balance is divisible. We have yet £15,000 to pay for debentures, and there is still a considerable amount to pay for coals; in addition to which, we require a large sum for working capital. On the debit side of the balance-sheet you will find that the amount owing by the company is increased by £7711, which sum includes £6000 borrowed from our bankers, pending remittances from Bombay, which had been withheld owing to adverse exchanges. We have added £2000 to the reserve-fund, which now stands at the handsome sum of, say, £8000. Turning now to the profit and loss account, you will find on the credit side that the gas and meter rental, which in June, 1875, was £19,855, for the half year under review amounted to £20,734, showing an increase of £879. For coke, our receipts, which in the half year ending in June, 1875, were £3410, were last half year £3223, showing a reduction of £187, which is abundantly accounted for by the fact that we did not get the same price for coke as we had previously received, the value of that article having a relation to the cost of coal, and falling with it. In tar, there is a slight decrease of £97, the amount in June, 1875, being £735, and last half year £638. Now I come to an item which is very satisfactory, because, as you know, we have been supplying fittings at the lowest possible price in the hope of extending the use and consumption of gas. This item of fittings shows an increase of £611. In June, 1875, the profit amounted to £265; last half year it was £876. The item of interest also shows an increase of £276. In June, 1875, it was £175; last half year it was £451. If you look to the other side of this account, I will call your attention to the item of coal carbonized, which shows an increase of £585; we have made and sold, as I have already told you, a considerable amount of gas more than we did the previous half year. In wages there is an increase of £7. In purifying, a decrease of £9; in mantenance of retorts, a decrease of £58; in trade and general charges, a decrease of £41; in salaries and collectors commissions, a decrease of £207; in rents, rates, and taxes, a decrease of £31; and in directors and auditors remuneration, a reduction of £50; all these items, of course, being in favour of the company. In bad debts, there is a slight increase of £8, the total being £35; but I think you will agree with me that this is a very insignificant item in comparison with the amount of our gross revenue in the half

year, which is £26,000. The item of exchange for the past half year amounted to £1200, being an increase of £600 upon the previous half year. The net profit of the half year shows an increase of £672; it was £11,090 in the previous half year, and in the half year under review it was £11,762. On the general revenue account I do not know that I have any remarks to offer. It will be satisfactory to you to know that our stock of coal, which is the raw material from which all our profits are made, was 9400 tons on the 31st of December last, and since then we have added to the stock—ordered and afloat—8200 tons, at a very considerable reduction in cost. The cost of coal in the last half year averaged £2 1s. 4d. per ton, as against £2 2s. 1d. in the December half year of 1874, showing a small reduction in our favour; but when you bear in mind that we have had to buy coal at nearly £4 per ton in past times, you will, I am sure, deem this satisfactory. As I said, we have a very large stock of coal afloat still, showing a considerable reduction. We have ample funds to fall back upon, and we are availing ourselves of every opportunity to get in good coal, and it has served our interest best of late to ship it from Australia. The gas made for the past half year was 36,141,000 cubic feet, as contrasted with 34,115,000 cubic feet in the half year ending June, 1875, showing an increase in the last half year of 2,026,000 cubic feet. So much for a comparison between the two half years. But contrasting the year 1875 with the preceding year, the figures are as follows:—The make of gas in 1875 was 70,256,000 cubic feet; in 1874 it was 65,951,000, showing an increase in the last year of 4,305,000 cubic feet. Now we come to the important item of gas sold. In the past half year the sale was 33,268,400 cubic feet; for the half year ending June, 1875, it was 29,558,300, showing an increase of gas sold last half year of 3,710,100 cubic feet. Contrasting the one year against the other, the gas sold in 1875 was 62,826,700 cubic feet; for the year 1874 it was 59,546,100 cubic feet, showing an increase in last year of 3,280,600 cubic feet. And now I must touch upon a subject which has pressed upon us with great severity—I mean the loss upon exchange. There is a committee of the House of Commons now sitting to examine into the causes of the depreciation in the value of silver. I am told that the value of the rupee this morning has fallen to 1s. 8d.; but Mr. Tulloch the manager of our bank, informs me that it is now 1s. 8¼d., and I may tell you that there is a loss of 1 per cent. upon every farthing the rupee is below 2s.; so that you will at once see this is a matter of great concern to us. As to the causes of the depreciation, it seems to me that the evidence taken before the committee as yet points to the fact that it arises mainly from the balance of trade being against India. The cotton crop and the exports from Bombay have fallen off to the extent of six millions during the past year, and when you bear in mind the fact that so serious a loss as this has occurred, you will easily understand that it not only affects us, but also the Government, and everybody who has any money to bring over from Bombay. We, in this country, pay chiefly for the exports from India in silver; there is six million less demand for silver on this side. Then there is the fact that Germany has demonetized her currency—it is now a gold, and not a silver standard. That again adds to the plethora on this side; and there is another element, the increased production of silver in America. The latter is not of very serious account, and would not alone cause the disturbance which has taken place in the Indian exchange. However, it is a long lane which has no turning, and I, for one, hope that a better state of things may at no distant date prevail in this respect. I will call your attention next to the new contract. You will remember that under this new contract, by which we have secured a monopoly of the lighting of Bombay for another 14 years, we had to extend our mains by 20 miles, and erect 750 additional lamps. That was no small undertaking, and the board and our manager in Bombay were under some uneasiness in reference to it; because, although we are to complete our work by the 1st of July, the Municipality of Bombay were in no particular hurry to indicate the lines of streets in which we were to extend our mains, and we could not proceed with our work till that was done. But, owing principally to the zeal and energy, diligence and ability, of our manager, Mr. Scott, this very arduous undertaking has been completed, and only on Monday last we received the welcome telegram in two words, "Extensions completed;" so that all our anxieties as to the performance of our conditions of the contract are at an end, and we shall be able to commence lighting under it on the 1st of July next. A reduction in the price of gas so private consumers, as well as to the Municipality, will take place then, and I confidently hope it will result for our benefit, as well as for the benefit of the public. The state of our works is satisfactory, though our leakage has increased, which is probably due to the extensions which have been carried out. A searching inquiry into the cause of this increase is being carried out by our manager and the officials in Bombay. I do not know that I have anything further to add, and will therefore move—"That the report and accounts be received and adopted, and that a dividend for the half year ending Dec. 31, 1875, be declared of 4 per cent., free of income-tax, payable on and after the 1st of June next."

Mr. LYALL seconded the motion.

A SHAREHOLDER asked how the reserve-fund was invested.

The CHAIRMAN said it was invested in coals and other things. There were very few companies who did not trade with their reserve-fund. The company also held bills which were remitted to them, and which they did not discount, but allowed to run to maturity, unless they required the money. They were unquestionably good bills, being drawn chiefly by the Chartered Mercantile Bank and accepted by the London Joint-Stock Bank.

A SHAREHOLDER inquired to what amount it was intended to raise the reserve-fund.

The CHAIRMAN said the directors had not yet made up their minds as to that point. It must be remembered that under the old contract they could not divide more than 7½ per cent. without reducing the price of gas; under the new contract there was no such restriction.

A SHAREHOLDER asked whether the price was taken upon the present value of rupees.

The CHAIRMAN said it was taken upon the nominal value of the rupee.

Mr. STEPHENSON remarked that everything in Bombay was carried on in rupees. The company paid all their wages and salaries in rupees; gas was paid for in rupees, and sometimes freight was so paid.

Mr. STOKES asked how the sale of the old stock of fittings and chandeliers was proceeding. Also what profit the directors anticipated from the illuminations in honour of the visit of the Prince of Wales.

The CHAIRMAN said the directors had written off so much from the stock of chandeliers, &c., as to reduce them to what they considered was their intrinsic value at the present moment. With reference to the illuminations, he was sorry to say they did not add much to the revenue. The Reception Committee appointed on the occasion of the Prince's visit, advised in their circular that the illuminations should be in oil, as being "at once cheaper and more effective," so that there was not a large sum received by the company on that account.

The motion for the adoption of the report was then put and carried.

On the motion of Mr. STOKES, the chairman, as one of the retiring directors, was re-elected; and on the motion of Mr. KING, the other retiring director, Major Gordon Fletcher, was re-elected. The auditors also were reappointed.

General RIGBY moved a cordial vote of thanks to the chairman and directors for the great attention paid by them to the affairs of the company.

The motion was seconded by Mr. STOKES, and carried unanimously.

The CHAIRMAN: Gentlemen, on behalf of my brother directors and for myself, I beg to make our best acknowledgments for this mark of your confidence. I can assure you that the business of the company is most diligently carried on. The attendance of the directors is most regular, and we give our time without stint, and our best energies, to promote your interests.

A vote of thanks was then given to the secretary, to the general manager in Bombay, and to the staff of the company generally, for the able manner in which their duties had been discharged.

The SECRETARY, in responding to the vote, said: I have great pleasure in acknowledging the compliment paid to the manager, to the staff, and to myself. As our worthy chairman has alluded so fully to the capabilities of the manager, I have nothing more to say in reference to him. As to the staff, I have the satisfaction to assure you that all our officers are zealous, careful, and energetic, and I believe are animated by an ardent desire to promote the interests of the company. I have no doubt they will all feel, as I do myself, much gratified and encouraged by this recognition of our services.

The proceedings then terminated.

MAURITIUS GAS COMPANY, LIMITED.

The Ordinary General Meeting of Members was held at the Offices of the Company, 29, Great St. Helen's, London, on Tuesday, May 23.—WILLIAM WHITE, Esq., in the chair.

The SECRETARY (Mr. A. Hersee) read the notice convening the meeting and the following report of the directors:—

The directors beg to submit a statement of accounts for the past year, duly audited.

The business of the company was conducted during the first few months of the year under peculiarly trying circumstances, owing to the critical condition of the original and (at that time) only gasholder. These difficulties, however, were surmounted, but the cost of maintenance and extra loss of gas were serious.

The new gasholder was successfully completed and brought into operation at the end of March, 1875, and it has since been working satisfactorily; the effect being evident in the immediate diminution of the extraordinary leakage.

The re-sheeting and repair of the original gasholder has also been effected. During the execution of this work, some additional repairs were found necessary, whereby the gasholder is now in a state of thorough efficiency, and the company are in a very safe position with regard to gas storeage.

In the last report allusion was made to the heavy cost of coals and freight. The directors have pleasure in stating that circumstances are now more favourable, and consignments have recently been made at considerably reduced rates.

Trade and finance in Mauritius continue in a depressed condition. The sugar crops of the past three years have proved very deficient, and to this, in some measure, may be attributed the slow progress of our operations.

The crop of 1876–77, however, promises to be one of the largest ever yielded in Mauritius, and the directors are hopeful the company may benefit by the consequent prosperity, and meanwhile escape any serious effects from the stagnation of trade. The migration to the suburbs of many former residents in Port Louis has also adversely affected the company. In spite of the foregoing drawbacks, there was an increased consumption of gas during the past year, both for public and private purposes.

The resident committee still comprises the Hon. H. Adam, Hon. M. Cunnal, and Hon. J. A. Ferguson, and their local influence is of great value. The manager, Mr. Delachi, having exerted himself in every way to increase the demand for gas, shares the disappointment of the directors at the unsatisfactory results.

The general revenue account shows a balance of £1179 2s. 9d., out of which the directors recommend a dividend of 2 per cent., free of income-tax, payable on the 31st day of May instant.

The director who retires by rotation is T. Chaloner Smith, Esq., and the retiring auditors are J. R. Prill and T. N. Stokes, Esq.; all are eligible for re-election, and offer themselves accordingly.

The CHAIRMAN, in moving the adoption of the report and accounts, expressed the satisfaction of the directors that the shareholders were to receive some return upon their capital, though it was so small. At the last meeting he indulged the expectation that the year 1874 would prove the only year for which no dividend could be paid, and repeated it now. A dividend of 2 per cent. was insignificant, but still it was an improvement, and although the original expectations might not be realized, the directors were encouraged to hope for further improvement. The condition of the company was a source of great disappointment to the directors. Their experience as directors of other gas companies had been that gas was so superior to other modes of lighting, that its consumption was bound to increase. Port Louis, however, appeared to be an exception, as the people were either indifferent, or too poor to use gas, for the manager reported that he made every effort to increase the number of consumers, with only limited success. Some explanation might be found in the fact that the island had passed through bad times during the past two or three years, and was not prosperous just now. An abundant or deficient sugar crop made a wonderful difference to manufacturers, sugar being the chief article of commerce; therefore, the prospect of an exceptionally large crop this year, coming after three short crops, was likely to cause a revival of trade, and the company might fairly hope that more gas would be required, and an increased demand for their products arise. The removal of many residents from the town to the suburbs was a matter of deep regret, for they mostly comprised those who were, or might be, good consumers of gas. This movement was due, in a great measure, to defective sanitary arrangements in the town, and also because the Governor resided in the suburbs. The distance was too far for a supply of gas from the present works; but some day it might answer the purpose of the company to put up a small branch works. There were still left in Port Louis a large number of persons who they trusted might become consumers, and continued efforts would be made to induce them to take gas. The completion and inauguration of the new gasholder was an immense relief to the directors; for, had the crown of the original holder given way entirely, the lighting of the town could not have been carried on till it was repaired. The effect of the introduction of the new holder, and the discontinuance of the defective one, was most striking; the leakage, which had latterly been at the rate of nearly 40 per cent., became immediately reduced to a nominal figure, and for the remainder of the year the loss of gas had averaged about 6½ per cent. On taking the original gasholder to pieces, some repairs to the tank and framing were found necessary, and the opportunity of having these executed by skilled and experienced workmen was taken advantage of. The additional outlay was well bestowed, for by the complete renovation of this holder, and the provision of the new one, the storeage capacity was sufficient for all the probable requirements for many years. The cost of this work had been met by the appropriation of the reserve-fund, and a sum of £219 out of the profits of the year. The onerous rate of exchange was causing the directors anxiety. The currency of Mauritius consisted largely of silver, and the great depreciation in value of that metal, added to dulness of trade, had caused the rate of exchange to rise considerably. The directors hoped that the evil was temporary, but they were not able to form any definite opinion upon this question, which was troubling many persons minds, and could only be solved by time. The steady and continuous decline in the cost of coal was a matter of great satisfaction. The average rate into store of the coal used by the company in 1873 was 53s. 9d. per ton, in 1874 it was 49s. 6d. per ton, in 1875 it was 46s. per ton, and the directors were hopeful that for 1876 it would not exceed 40s. per ton. A large increase in the consumption of gas was alone required to bring about a return of prosperity. The cost of manufacture was now on a favourable footing, the fixed expenses would not increase to any extent, and the works were adequate for the supply of a much larger quantity of gas. It remained to be seen whether the anticipations in connexion with improved trade were likely to be realized or not, but the directors, under any circumstances, would spare no efforts to present a more favourable account next year.

The motion for the adoption of the report and accounts was seconded by Mr. CHALONER SMITH, and carried unanimously.

Some conversation arose in reference to the non-publication of the accounts, and it was proposed by Mr. M'CLELLAND, that an abstract of the accounts

should in future accompany the notice convening the meeting, but the motion was negatived on being put to the vote.

Mr. STOKES, as one of the auditors, drew attention to the great loss by exchange, which was likely to press still more heavily during the present year, and inquired whether a saving might not be effected by making a consignment of produce instead of remitting by bank bills. He suggested one shipment as an experiment, for a loss of 14 per cent. by exchange was very serious indeed.

The CHAIRMAN, in reply, pointed out that such transactions were not within the powers of the directors as defined by the Articles of Association, and, therefore, could not be undertaken; he doubted, moreover, whether they would result profitably.

The retiring directors and auditors were then re-elected, and the proceedings were concluded by a vote of thanks to the directors.

LEEDS CORPORATION GAS-WORKS.

GAS ENGINEER'S REPORT ON MANUFACTURING AND DISTRIBUTING PLANT.

(Submitted to the Gas Committee May 1, 1876.)

Mr. Chairman and Gentlemen,—In compliance with your instructions, I have pleasure in making the following report upon the present condition and future requirements of your manufacturing and distributing apparatus, in view of the rapid growth of the town and of the extended use of gas for lighting and other purposes.

Computing the population of Leeds at 290,000, and the gas sold at 846 millions, it appears that the present consumption is at the rate of 2800 cubic feet per head of population—a quantity equal to the average supply in large manufacturing towns. If, however, we divide the quantity sold by the number of customers, or meters in use, say, 64,000, we have 13,200 feet as the consumption of each customer, a quantity not exceeding one-half of the average consumption per customer in similar towns, or one-third that of the average customer in London. It is clear, therefore, that the small average consumption per customer in Leeds is to a considerable degree due to the very general use of gas by the population, there being very few, even of the smallest houses, not supplied. Now, if we deduct one-half from the number of our customers—that is, the excess over the average proportion in other towns—and if we call the average consumption of these 7000 feet per annum, we have 224 million, leaving, as the consumption of the other half, 622 million, or an average (including gas supplied to public lamps) of 19,400 feet each, or not more than two-thirds of an average. Taking these circumstances into account, along with the facts as to the small size of our mains, and the very general complaints of short supply, I feel justified in expressing my opinion that were it possible for all our customers to obtain all the gas they require, the sale would then be somewhat as follows:—32,000 customers at 7000 feet = 224 million; 32,000 customers at 27,000 feet = 864 million; total, 1088 million. And this, I believe, to be rate of demand at the present day, but which demand we fail to meet by 28 per cent.

The quantity given above is that required for consumption, to which must be added the quantity required to supply the leakage, which may be estimated at 150 millions. But as it is probable that, however largely the demands of our customers may increase, there will during the next ten years be no increase in the quantity lost, I have for the purposes of this calculation added a constant quantity of 150 millions to the estimated demand of each year, to give the quantity required to be manufactured.

Presuming my estimate to be accurate, and reckoning for an increase at the moderate rate of 5 per cent., we should double our present sales in a period of ten years, thus:

	Millions.	Leakage.	Total.
1875	846	156	1002
1876	1088	150	1230
1877	1142	150	1292
1878	1200	150	1350
1879	1260	150	1410
1880	1323	150	1473
1881	1390	150	1540
1882	1459	150	1609
1883	1532	150	1682
1384	1608	150	1768
1885	1688	150	1838

Our average daily make in the depth of last winter amounted to 5,081,000, so that, according to the estimate I have given, we shall have to provide for a make of 6,500,000 feet per day next winter, 6,800,000 in 1877, 7,140,000 in 1878, 7,497,000 in 1879, and 10 millions per day ten years hence; and from my knowledge of the many purposes to which gas can be applied economically, and of its growing popularity for cooking and heating, and as a motive power, I feel convinced that I am not overstating the case.

Our present manufacturing capabilities depend on 797 retorts at Meadow Lane, 380 at New Wortley, and 270 at York street; total, 1447, equal to a make, at 4000 per mouthpiece, of 5,788,000 feet per day. To make 6,500,000 would require 1625 retorts, so that it appears we shall require 178 retorts more than we have got to meet the requirements of next winter. Then, I am of opinion that it is impracticable to erect new works ready for action before November, 1877, by which time the demand will have so increased that we shall require a further number of 82 retorts, which, together with the present deficiency, makes 260.

So soon as new works can be erected or brought into operation, I consider it desirable to remodel our plant at York Street; and it is, therefore, necessary that in erecting additional works provision should be made for that eventuality. Thus I have respectfully to recommend for your consideration the erection of works at New Wortley capable of producing such an increased quantity of gas as would be required between the present date and the winter of 1879, *plus* the quantity which our York Street works are at present producing—that is to say, the demand in 1879 will be 7,500,000 per day, and will have to be supplied by our works at Meadow Lane and New Wortley, requiring at those stations 1875 retorts. At present we have only 1177, so that we have to provide an additional 698. Owing, however, to the limited area of the site newly purchased, I cannot recommend the erection of more than 576; and I trust to being able, by care, to increase the yield per retort beyond the reasonable estimate I have named, so as to meet the demand anticipated.

I trust I have thus made it clear to the committee that, until the York Street works shall have been remodelled, or works other than those contemplated at New Wortley shall have been erected, we shall not be in a position to meet the requirements of the time except under extraordinary pressure.

The works suggested by this report and by the plan I now submit, I estimate at about £80,000 complete, and would comprise retort-house, 380 feet long by 70 feet wide, and containing 288 retorts, 20 feet long, with 25 feet of floor-space in front on each side, ample for a mechanical stoker; coal stores on either side of retort-house, to hold 5000 tons; condensers, engines, scrubbers, &c., and 8 purifiers, 30 feet by 20 feet; 2 gasholders, 150 feet by 36 feet, to contain 1,250,000 feet each; station-meters, governors, and all connecting-pipes.

In view of the very extensive additions to your plant herein contemplated, I have directed my attention to the desirability of improving the general system of mains and distributing apparatus, and with that object I would recommend that the holders at Sheepscar be apportioned exclusively to York Street, instead of being as now, common to that station and Meadow Lane; and that the latter station be made independent of Sheepscar by the erection of a large holder at Dewsbury Road (150 feet) in lieu of the present one, which is quite worn out.

Under this arrangement we should have—

	Cubic Feet.	Cubic Feet.	Cubic Feet.
New Wortley works, making	3,824,000	—	—
New Wortley, holder room	—	4,000,000	4,000,000
Meadow Lane, making	3,185,000	—	—
Meadow Lane, holder room	—	426,000	—
Dewsbury Road, holder room	—	1,250,000	—
Kirkstall, holder room	—	879,000	—
Wortley, holder room	—	384,000	—
			2,939,000
York Street, making (say)	2,500,000	—	—
York Street, holder room, Sheepscar	—	1,690,000	—
York Street, holder room, St. Peter's Square	—	358,000	—
			2,048,000
Total	9,509,000	8,987,000	8,987,000

The holder at Dewsbury Road, less the value of the material of the old one, would cost about £15,000.

Mains.

Making 10 millions per day, we should require to send out about 1,500,000 during the hour of greatest consumption, necessitating delivery-pipes having a united area of 2500 square inches, and this we have already, though very unequally distributed. For instance, we have from our Meadow Lane works distributing pipes of a united area of 1200 inches to a gasholder capacity of 800,000 feet; whereas at Sheepscar, we have only an area of 150 inches to a gasholder capacity of 1,700,000 feet. The effect of this is that it is rarely possible to maintain full pressures at Meadow Lane in winter, later than 5 p.m.

During the winter, in order to inform myself as to where the supply was deficient, I had the pressures taken at about 200 different points along the chief thoroughfares during the hour of greatest consumption, and the recommendations contained in the accompanying statement are based upon the information thus acquired.

Beyond all this, however, I have found, from a careful measurement of our mains, that the proportion of 2-inch mains and smaller sizes is about 65 per cent. of the whole, or supposing we have 500 miles of mains, then 325 miles would be 2-inch and under—sizes which are being generally abandoned, and which I would urge you to replace as opportunity occurs. But inasmuch as the work specified herein is fully as much as it will be possible to get through before next winter, I cannot at present recommend any course of procedure with regard to the smaller sizes, but I have estimated that the renewal of these would cost about £100,000.

The accompanying statement contains a total length of mains, recommended to be laid this season, of 10 miles—

Gross cost	£11,242 9 2	
Old mains to be taken up	3,256 12 6	
		£7985 16 8
Extra value of iron chargeable to capital		4935 15 0
Net cost chargeable to revenue		£3050 1 8

To the above item must be added the cost of renewing service-pipes (it being my practice to reinstate the service-pipes wherever mains are relaid), probably £1500. Total, £4550.

Total expenditure on capital account—		Revenue.
For new works, New Wortley	£80,000 0 0	—
For holder, Dewsbury Road	7,500 0 0	£7500 0 0
For mains	4,935 0 0	3050 0 0
For services		1500 0 0
	£92,435 0 0	£12,050 0 0

In conclusion, permit me respectfully to urge upon you the desirability of coming to a resolution upon the question of new works at the earliest opportunity, as the time required for the work is considerable, and it is imperative that we should have additional plant in use during the winter of 1877.—I am, gentlemen, yours obediently,

(Signed) HENRY WOODALL, Gas Engineer.

ON THE CONSTRUCTION OF GASHOLDERS.

[From *Le Journal de l'Eclairage au Gaz.*]

At a Meeting of the Society of Civil Engineers, Paris, on the 3rd of December last, a discussion took place upon a communication made by M. Arson, upon the rules observed by the Paris Gas Company in the construction of gasholders. The following is the subject upon which discussion was invited:—

The methods adopted by the Paris Gas Company in the construction of gasholder-tanks are of quite a special nature, and have nothing in common with the rules generally admitted in theory. Thus there is usually given to the walls sustaining a pressure of water a thickness at the base equal to the half of their height. We should be led, therefore, in the case of the tanks of certain gasholders in which the water rises to a height of 14 mètres (46 feet) to give to the walls a base of 7 mètres, which would be impossible of realization, and in all cases exceedingly expensive. All constructors of gas-works have successfully reduced the thickness theoretically indicated, and have arrived at an extremely small limit; in fact, to one-tenth of the height as the thickness of the base.

It was natural to seek the reason for the stability of gasholders constructed under these conditions, and it was ascertained that the resistance of the ground was the only explanation of that result. Consequently, trials were made to determine to what extent different grounds could be compressed without deformations, and it was found that in the case of sand this could be done to the extent of 100 kilogrammes (about 2 cwt.) per square foot, in the case of marls 80 kilogrammes (about 1½ cwt.), and earths 40 kilogrammes (about ¾ cwt.). Several works have been constructed with perfect success; but as other causes of failure may perhaps arise, observations will still have to be made, the more so as certain accidents which have occurred have presented features differen from thoseit was possible to foresee.

Thus, when a crack shows itself, it almost always opens at the upper part of the tank, where the pressure of water is *nil*, and descends vertically to a greater or less depth.

Another very remarkable thing occurred in a tank of 150 mètres (about 500 feet) circumference and 14 mètres high, built entirely in sand, and constructed of masonry composed of hard rough stones and Portland cement mortar, behind which the ramming had been done with great care. When the water had risen to nearly the highest level, a crack, 1½ millimètre wide, occurred from the top to the bottom, following a vertical generating line. The explanation of this fact appears difficult; it proves, at any rate, that but little reliance can be placed upon the elasticity usually accorded to masonry, since, in a circle of about 500 feet, this elasticity was insufficient to stand against an extension of 1½ millimètre; and if it is to be supposed that this elasticity exists, in a certain measure, when the masonry is submitted to an effort of compression, it may be said that masonry must have very little elasticity under an effort of traction.

However that might be, M. Arson called the attention of engineers to this novel fact, and upon it the discussion turned. He also briefly recapitulated the explanations he gave upon the mode of guiding the crowns of gasholders by means of tangential rollers in lieu of perpendicular ones. By the employment of the first system, only a displacement of the crown of the holder occurs under

the action of the wind, without any deformation of the guidage system, while the second arrangement does not prevent the tendency to deformation.

M. DE DION inquired how the ramming of embankments was effected, and whether it went on proportionably with the execution of the masonry.

M. ARSON said it was done while the construction was going on, but great care was taken to allow five or six days, at least, to elapse between the execution of the masonry and the making of the embankment. It was, above all, important that the ramming should be done quite horizontally. This precaution was considered as very essential. The sand was thrown at random, like seed, and the workmen beat it down in proportion without stopping, so that no part escaped the action of the rammers. In that way a soil of a compression-comparable with the oldest grounds was obtained.

The PRESIDENT saw, in the fact of the ruptures occurring in the upper and not in the lower part, an indication of the possibility that the lower layers being more compressed, inasmuch as they sustained the successive rammings and the weight of the upper layers, the ramming was probably not so vigorously carried on above as below, and that would explain the production of escapes in the first instance in the upper part.

Mr. ARSON did not believe that any influence was exercised on the lower layers by the ramming of the upper ones. The action of ramming caused an agglomeration of the grains of sand, and when this effect was obtained in an enclosed space, compression no longer increased. In that respect there was what appeared to be a complete derogation from the generally admitted law for the thrust of earth in their natural state—namely, that the pressure upon a sustaining wall would be produced by the sliding of a prism of thrust, of which the maximum of action would take place in the centre of gravity, even if it were at the third of the height. Compression, on the contrary, produced an even pressure from top to bottom, and the centre of thrust is extended to half the height. There was, besides, an entire difference between the properties of uncompressed sand and that which had been compressed. The former was the most shifty and unstable soil, in consequence of the grains sliding one over the other; the latter, on the contrary, was very compact, and offered the greatest resistance to the driving of piles, and constituted the most suitable ground for embankments. This sand had then acquired a particular state of agglomeration which caused it to resist like a solid body, and it was this condition that was sought to be produced.

M. BADOIS remarked that, in the case of the rupture cited by M. Arson, the appearance of the crack had seemed to indicate that there had been shrinking or contraction. Would there not be, in fact, a contracting action of the cement, whether on account of the nature of the material, or in consequence of a difference in density of the samples furnished?

M. ARSON thought not. Trials had been made on the contraction that might be occasioned by the use of Portland cement in different states of mixture with sand. Employed alone, cement mortar should open fissures at distances of every 3-10ths of a mètreon the average; mixed with an equal part of sand, the fissures only occurred at distances of every mètre; with two parts of sand they almost entirely disappeared; finally, mortar composed of one part of cement and three parts of sand gave an extended surface perfectly free from fissures. This was the mortar employed for the masonry of gasholder-tanks. Besides, Portland cement does not harden too rapidly, which allows of its employment with facility, and though it does not attain the whole of its hardness until several days after its use, it may be considered that its hardening is complete from the second or third day. It was then that contraction would take place, if there should be any. As to the possible difference of density in the cements furnished, that could not have had any influence upon an accident which had affected the entire height of the work, since the contraction was carried on in courses and in crownwork.

M. PAUL believed that the effect in question might be attributed to a contraction caused by a difference between the temperature of the masonry and that of the water introduced into the tank. He observed that masonry, especially that composed of millstones and cement, was much more sensitive to the effects of heat than one would be disposed to believe. As to the resulting expansions and contractions, he had noticed a number of circumstances which proved it.

M. ARSON acknowledged that the crack in the tank occurred under pressure. The temperature of the water was not very different from that of the masonry, and had not been introduced into the tank till three months after its construction. Other works under similar conditions had not given rise to such accidents.

The PRESIDENT referred to the case of a perfectly vertical crack from top to bottom, which he had witnessed in a water reservoir. In this instance there could be no doubt as to the cause of the accident, which arose from the ramming having been badly done. The repair was effected by binding the reservoir on the exterior, and ramming the ground again with greater care.

M. ARSON said it was in that way that the accident he had referred to had been repaired, and similar works that had not sustained accident had been strengthened.

M. DE DION referred to some experiments which he had occasion to make on the resistance of sand. If upon a conical heap of sand were placed a flat plate, the weight of which was progressively increased, it was noticed that the pressure, in consequence of the surface of support, augmented rapidly, especially when the base of the cone and the compressing surface approached each other. Similarly, if a plate of glass were used, it would be observed that the grain of sand, once in contact with the glass, underwent no horizontal displacement. The horizontal displacement of the sand was, therefore, caused by the decomposition of the sliding surfaces in the height comprised between the base of the cone and the compressing plate. It is, therefore, proper to admit that the sand, in shifting, underwent a rubbing which gradually increased from the exterior to the interior of the disc compressed, according to a law depending upon the thickness of that disc. In the case of a sand compressed between two vertical surfaces and a flat bottom, the resistance to the displacement would be much greater at the lower than at the upper part.

M. ARSON contended that comparison might be made between sand forming an embankment with a natural slope and that rammed behind the tanks of gasholders, in an enclosure. The form of the cone of sand experimented upon by M. de Dion did not allow of the supposition that ramming had taken place. If the summit were pressed upon, the centre was, in fact, much more compressed than the rest; while behind the tanks the sand obtains a sensibly equal compression in every part.

The PRESIDENT thought it would be interesting to ascertain whether the compression would not be greater as they rose.

M. ARSON said he would make a memorandum of the remark, and institute some experiments in that respect.

M. DE DION also wished to determine the pressure of sand on the base of a pipe. He had used a tube of 2½ inch diameter, filled with very dry and very fine sand, mixed with titané iron and quartz. When the tube was placed vertically in the scale, after having been filled with sand well pressed in, and the tube gently withdrawn, the beam of the scale followed the movement as long as the counterweight was above 120 grammes. With sand simply poured in without pressing, the counterweight rose to 300 grammes; it fell to nearly 120 grammes if the sand was pressed. The density of the sand was 2·57. it followed that the pressure on the base of the tube was equal to a cone, the generating line of which made, with the surface of the tube, an angle equal to that of the slipping of the sand.

M. ARSON could easily understand the results obtained in M. de Dion's experiments, if in proportion as the sand was heaped up the pressure diminished, the sand being pressed horizontally and evenly. In the conditions inquired into by the Paris Gas Company it was sought to give the sand the greatest horizontal compression possible.

M. GIGOT remarked that if the escape presented the same opening below as above, it was an indication that the pressure of the sand was equal, as otherwise the fissure would have been larger at the spot where there was the least resistance.

M. ARSON indicated the manner in which the work of construction was carried on. At the lower part of the excavation there was a thickness of about 13 feet of old sand, very hard, that had been broken up by the pick to the diameter of the tank, and against which the rough stones had been forced. Between this ground and the embankment above it there was a thin layer of clay. Now the crack occurred both in the lower part, communicating with the old ground, and in the upper part communicating with the embankment. It was ascertained besides, by means of excavations made for effecting the repairs, that the rammed sand was as compact, and yielded as well to the pick, as the old ground.

The PRESIDENT thanked M. Arson for the explanations and interesting details he had given to the society, and the discussion on the subject terminated.

MINERAL COMPENSATION CASE.

An important claim for compensation, brought in terms of the Lands Clauses Consolidation Act, was recently tried in the Airdrie Sheriff Court, before the Sheriff of Lanarkshire and a special jury. The petition was raised by the Caledonian Railway Company, in consequence of their having received intimation from Messrs. Henderson and Dimmack, coalmasters, Drumpellier, Coatbridge, that at various points their coal workings had reached the statutory distance of forty yards from the railway viaduct at Coatbridge. As the minerals under the viaduct could not be worked without danger to the structure, the railway company agreed to pay for the same, but no satisfactory agreement could be arrived at between the two parties as to the price to be paid by way of compensation. It was affirmed that the coal within the specified area in question amounted to 37,036 tons, and for this loss and extra expense to which the claimants would be subjected in working the coal in the adjoining seams, they demanded the sum of £9000.

Much interest was felt in the case by the owners and lessees of mineral estates in the Middle and Lower Wards of Lanarkshire, more especially as the claim raised by Messrs. Henderson and Dimmack was believed to be the first of a series, and that the other claims would be decided very much in accordance with the decision that might be given in it.

The Solicitor-General for Scotland (Mr. Watson) and Mr. Johnston appeared on behalf of the railway company; and Mr. Balfour and Mr. Asher for Messrs. Henderson and Dimmack. Large numbers of professional gentlemen were cited as witnesses by both parties, and as it was hoped to make the gas coal lying in the estate a leading feature in the case, there were among the witnesses Mr. Horatio Brothers, C.E., one of the engineers to the Chartered Gas Company; Mr. George R. Hislop, F.C.S., engineer and manager of the Corporation Gas-Works, Paisley; Mr. Samuel Stewart, C.E., manager to the Greenock Corporation Gas Commissioners—all for the claimants; and Mr. William Foulis, C.E., manager to the Glasgow Corporation Gas Commissioners, and Mr. Watson, gas manager, Edinburgh—both for the Caledonian Railway Company.

Without entering into any of the other details of the case, which, by the way, lasted during seven days—we may confine ourselves to a condensed summary of the evidence given in reference to the gas coal. On the part of the claimants it was stated by Mr. Henderson that the total thickness of the section which they were working was 10 feet 11 inches, of which 11 inches was gas coal.

Mr. Hislop deposed that he had been four years manager of the Coatbridge Gas-Works, and that during the last eleven years he had been engineer and manager of the Paisley Gas-Works, and during that time he had purchased coal for the works. They were using at Paisley from 15,000 to 16,000 tons per annum. He had received three samples of coal from Drumpellier last March, and made an analysis of them. The coal of the Lower Kiltongue seam yielded a considerable volume of gas of fair quality, and excellent coke. It would be saleable in the market for gas-making purposes, and during the last six months it would be worth about 10s. per ton at the pit-head, although now it had become somewhat lower. The present low price of third-class cannel had been unparalleled during the last 25 years. The gas coal in question belonged to the second-class qualities.

The remainder of the evidence of the gas managers who were witnesses for the claimants went mainly to prove the following facts:—The gas coal in question consisted of two seams in the Upper and Lower Kiltongue coal, the upper seam embracing both soft and splint coal, together about 67 inches in thickness, giving, by Mr. Hislop's analysis, a yield of about 10,000 cubic feet of 19½-candle gas, with an excellent coke. This quality of gas being above the average of that made throughout England, it was held that the coal would command a ready sale there, more especially in the London market, where the quality of the coke was looked to as closely as the quality of the gas, when buying coals. The lower seam consisted of a stratum of splint coal 22½ inches thick, and one of cannel 10½ inches thick, the latter, on analysis, giving a yield of above 10,000 cubic feet of about 26-candle gas, and a good coke; and as this was a class of cannel very much in demand for small works, from the fact that it gave a good yield of a fair quality, and yielded a good coke, it could be worked alone, like Glengarnock, Shieldmuir, Allanton, and various cannels, without any admixture of other coals either for quality of gas or for firing purposes. The quantity of these coals in the market being limited, they could always command a somewhat higher price than similar qualities of cannel, as regards yield and quality of gas alone. An analysis of a mixture of the whole of the seams—gas and splint—gave an average yield of 10,000 cubic feet of about 22-candle gas, with a fair coke; and such a mixture was consequently very suitable for using in the south to bring up the quality of the gas. The splint coal was valued at 8s. per ton at the pit-head, the mixture at 10s., and the cannel alone at 15s. per ton. Such prices were rather higher than those now prevailing, but they were a fair average of what might be expected over an average of two or three years.

Mr. Foulis, in the course of his evidence, said that it was part of his duty to purchase coal for the Glasgow Corporation Gas-Works. They used about 180,000 tons in the year, some of first and the remainder of second quality. He had seen the analysis of the cannel coal, got on the Dundyvan estate (adjoining Drumpellier), and said that coal of similar quality was used at the Glasgow Gas-Works. During the current year they had had about 50,000 tons of that quality. The last contract was made in October, 1875, and the coal was got from Provanhall and Braehead, the price paid including carriage to the works. For one portion of the contract the price was 7s. 8d. per ton, and for the other 8s.—both being for round coal. The price of a similar quality in 1865 was 6s. 6d. per ton, and in 1866 it was 11s. 6d. In the following four or five years it was 10s.; in 1873—the "famine" year—the price was 18s; in 1874, 12s.; and in 1875, 12s. Leaving out of consideration the current year's contracts at 7s. 8d. and 8s. per ton, the average for the last eleven years was 10s. 8d. The carriage on that coal was now 1s. 6¾d. per ton, thus giving at the pit-head a price of 6s. 1¼d. and 6s. 5¼d. on the present contract prices. He did not know just what the carriage charges were during the eleven years, but he thought they were a little greater than at present. The analysis of the Drumpellier coal showed that it was practically of the same quality as that purchased by the Glasgow Gas Commissioners. In 1873 they tried the experiment of using splint coal mixed with shale, but it only answered that year owing to the high prices. They had not used it for gas-making purposes since the dear year. In cross-examination, Mr. Foulis said that, excluding the dear year, the average price at the pit-head would be 8s. 5¼d. per ton. In Glasgow a coal of high illuminating power was required, as a coal that would suit English towns would not do in Glasgow. In England the quality of the coke was of much more importance than in Scotland, and the coke containing the least quantity of ash was the most valuable. He certainly

did not think the Dundyvan cannel coal suitable for the English market, as the gas companies in England could get coal there which gave a superior coke. He did not think they would buy the Dundyvan cannel, especially as the carriage was very high, and, as a matter of fact, they did not buy that coal. The sulphur and ash were greater in the Bradisholm cannel than in the Dundyvan.

Mr. Watson, Edinburgh, generally corroborated the evidence given by Mr. Foulis.

Mr. Bennett, salesman, Provanhall Colliery, deposed that the Bradisholm cannel produced 10,859 cubic feet of 27·86-candle gas per ton, as against 10,830 feet of 25·22-candle gas from a ton of Dundyvan coal. They had a contract which gave a price of 10s. 6d. per ton at the pit-head, and they had offered this year to give a larger quantity for 7s. 6d. per ton. At present they were delivering a contract to Glasgow, which left them 6s. 4½d., delivered in trucks at the pit-head. For Paisley, Greenock, and Glasgow, they were more favourably situated than the Dundyvan Colliery. In March last, they offered 6000 tons to Paisley, at a price of 6s. 6d. per ton, but the offer was not accepted. That class of coal was more plentiful at present than the demand.

As originally made, the claim was for £9000, but the Caledonian Railway Company subsequently allowed the claimants to form mines under the railway in such a way as to lessen the damage very materially. This, and the subsequent discovery that a portion of the coal under the viaduct was not solid, led to the claim being restricted, before the jury, to £5000. The company tendered £5. Various mining engineers estimated the value at sums ranging from £4467 up to £5699.

After Mr. Balfour and the Solicitor-General had addressed the jury, the Sheriff summed up, and the verdict of a majority of the jury was for £2306 6s. 6d. It is believed that the railway company's expenses will amount to at least £3000 additional.

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

The settlement of the miners strike in North Derbyshire would now appear to be an accomplished fact, the whole of the principal collieries being again at work at a rate of wages which is, on the average, a reduction of 12½ per cent. from that in force prior to the dispute.

In South Yorkshire, on the contrary, the miners, probably numbering some 16,000 or 17,000, are showing no signs whatever of giving way. They are, of course, now supported by the Derbyshire men and by the National Union, and declare that they will hold out for an indefinite period against any reduction of 7½ per cent. It should be stated, however, that there is no scarcity whatever of coal or other fuel. The manager of one of the largest iron-works in England told me the other day that, although all their own collieries were on strike, they had such a plethora of coal sent from other districts that they had been compelled to stop the influx. This fact alone shows how deeply depressed all the branches of the iron and steel trades are, and also serves to illustrate the fact that our coal supply is at present fourfold in excess of the demand.

There is a fair inquiry for gas coal at 7s. 6d. to 9s per ton, at and between which limits contracts are being arranged. For steam qualities there is a slightly improved inquiry on shipping account, albeit just at present the Welsh shippers are carrying off the great contracts from the south and west with much ease, owing to the lowness of their quotations.

I cannot, once more, say much of the iron trade, and that little must again be in the cheerless tone which has of necessity pervaded my (and all other) reports for months past. There is no change for the better in any department, and it has now become a current saying in the trade, that the man, now-a-days, who wishes to sell iron, must be prepared to lose money by the transaction.

The founders are only indifferently engaged, and prices of castings are very weak where large lots are inquired about. The local merchants have lowered bars to £8 10s., hoops to £10 10s., and sheets are £14 per ton.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

Though considerable depression continues to prevail in the iron trade of this district, it appears, from reports just received, that local makers are quite as well off for orders as any of their competitors in other iron-producing centres. Makers of leading brands are firm in their adherence to recent quotations, their hands having been strengthened lately by the distribution of a few good specifications for sheets, on account of the Indian and Australian markets, but new orders are now rather scarce. Plates are especially neglected, and prices are easy. Makers of the commoner qualities of unmarked iron are not so well supported, and prices are exceedingly weak and irregular. Production in this department of the trade has now been reduced to a lower limit than has been known for many years, though prices are nominally unchanged. Some heavy speculative transactions are reported, at prices which must necessarily prove unremunerative. Belgian importations of the commoner qualities of iron continue to be made, though not on quite so extensive a scale as recently reported.

The engineering and ironfoundry establishments are moderately occupied, and it is difficult to place orders of any extent, should early delivery be required.

For pig iron the market is unchanged. Good qualities of native all-mine are firm at £4 10s. for hot-blast, and £5 10 for cold-blast makes, but inferior qualities are weak, owing to the severe competition on the part of Cleveland and Derbyshire smelters.

The coal trade rules dull, and few of the collieries are at work more than half time, but prices for the better qualities of fuel are still upheld by the associated masters. The reduction in wages, and the extension of working hours, to which the miners in Warwickshire have just submitted, has produced a favourable impression upon the trade here, and it is hoped that a similar concession will shortly be made by the miners in this district.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

Although there are a considerable number of inquiries for quantities in the market, no very large amount of business is yet being done in gas-making coals. Quotations in the Manchester district are about the same as those given last week, and at the pits in the Wigan district the average prices quoted are about 21s. to 24s. and 25s. per ton for ordinary unpicked cannel at the pit mouth; 11s. to 11s. 6d. for good qualities of screened gas-coal; 9s. to 10s. for ordinary qualities; and 7s. to 8s. 6d. per ton for ordinary unscreened coal for gas-making purposes. These prices, however, may not be final, as there is no great amount of firmness in the market generally, and when the large contracts are given out, prices will, no doubt, be very much governed by the amount of competition in the market. In other classes of coal there are indications of a falling off in the demand. Best coal for house-fire purposes is not in so much request, and stocks are again going down in the Manchester district. Coal for iron-making purposes is very dull, and, with the exception of a good demand for fuel for brick-making, there is no push for either burgy or slack, although the general smallness of supplies maintains late prices; but, with the prospect of short time being worked in the cotton trade, there is a probability of considerable quantities being thrown upon the market, which must have some effect upon values.

The shipping trade continues in a very inanimate condition, and very little business is being done. Prices are without much change, as they are already as low as sellers can afford to take for legitimate business transactions.

Coke also still meets with very little inquiry, and prices are nominally the same as those last quoted.

There is no improvement in the demand for any class of iron, and prices are again weaker. Lancashire makers are now offering at 53s. 6d. for No. 3 foundry, and 57s. 6d. for forge qualities delivered into the Manchester district, and Middlesbrough makes at 54s. 3d. for No. 3 foundry, 53s. 9d. for No. 4 foundry, and 53s. 3d. for No. 4 forge, net cash, delivered into this district. Manufactured iron is very flat, and scarcely any orders are stirring. Prices nominally are the same as last week, but there is a very keen competition for any little business that is to be secured.

Many of the works are so quiet that considerable numbers of hands have been discharged, and the closing of the works for a longer period than usual at Whit-week is talked about.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

As predicted in the previous week, there was a better arrival of sailing vessels in the northern coal ports last week, through a change in the wind. Coals were less in demand, and London coasting freights would fall about 3d. per ton all round. The close of the great strike of the South Yorkshire miners has had a considerable effect in checking the demand for sea-borne coals from the North, and the returns from the Tyne Dock showed a falling off in the shipments of gas coals from that great establishment last week. Prices had a tendency downwards, with somewhat slacker employment at the pits. In consequence of a depression amongst the second and third class Durham collieries, the Durham mineowners have given notice of another reduction of 10 per cent. upon pitmen's wages. The Northumberland collieries work pretty well; the demand for steam coals upon the whole is satisfactory, though it is not excessive. But household coals are quoted at from 11s. 6d. to 12s. per ton. There is no great trade, however, at this price.

The new shipping-places at the Tyne Dock for loading gas coals are being rapidly finished; 20,000 tons of coals can be shipped in this dock in a day. Many steamers trading from it make between 50 and 60 voyages in a year to London. Four hours after entering the dock a steamer of 1000 tons is loaded and can proceed to sea upon the flood tide, if the coals from the collieries are ready.

In respect to the iron and general manufacturing trades of the North of England, little new can be said. The iron trade does not recover tone at all, and business remains in a very depressed state in the Cleveland district. The chemical and other trades of Tyneside can only be described as flat. The chemical market is very depressed at present, and prices are extremely low. The fire-clay and fire-brick trade is fairly well employed, but there is no excessive demand for any sort of goods. The building trade is the busiest, and most of the masons and operatives employed in house-building on the Tyne have secured an advance of 4s. per week lately.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

The Kirkcaldy Municipal Bill having passed the select committee of the House of Commons, the event was made the subject of general congratulation in the town on Saturday, the 20th inst. Besides making provision for improving the harbour of Kirkcaldy, extending the municipal and police boundaries of that burgh, &c., the bill proposes to empower the corporation to purchase the undertaking of the Kirkcaldy Gaslight Company, and to supply gas.

A good deal of interest is still being manifested in connexion with the Burghs (Scotland) Gas Supply Bill. It is again to be considered by the select committee, on Tuesday, the 30th inst.; but it is not anticipated that any evidence from the Glasgow Corporation Gas Commissioners will be taken, unless the committee find a difficulty in agreeing to revise their work, when evidence may be taken as an expedient for reconciling differences within the committee. Several interviews of a private nature have recently been held between Sir Windham Anstruther and gentlemen from various Scotch burghs regarding the bill in question. Among those who attended the interviews were Mr. George Harrison, Mr. Nelson, and Mr. Watson, representing the Edinburgh Gas Company; Provost Watt, Mr. Duncan, and Mr. Reid, for the Edinburgh and Leith Company; several members of the Town Council of Glasgow, accompanied by the town-clerk, &c. It is stated that Sir Windham Anstruther has agreed to various amendments which will, it is believed, satisfy the incorporated companies of Edinburgh and Leith, as well as the Glasgow Corporation Gas Commissioners. It is also expected that they will meet the requirements of such non-incorporated companies as those of Elgin and Helensburgh. The proposed amendments have received the approval of Mr. Massey, chairman of the select committee. A few days ago the new proposals were brought under the consideration of Mr. Raikes, the Chairman of Ways and Means, and the right honourable gentleman offered no objection to them. He is understood to be anxious to make the bill a thoroughly good one, in order that it may pass and become law during the present session.

At the last meeting of the Town Council and Police Commission of Cupar, it was moved by Mr. Adamson that the commission should petition against the Burghs (Scotland) Gas Supply Bill, on the ground that if it passed, and the commissioners wished to take the gas supply into their own hands, they would be compelled to take over existing works, whether or not they were in a favourable state. Treasurer Westwood seconded the proposal. It was moved by Bailie Miller that the bill be remitted to a committee, which was seconded by Bailie Milne, who was of opinion that the municipal body were bound to give consideration to the gas company for having long supplied the town. The Provost supported the amendment, but he did not agree with the opinion expressed by the seconder of it. As a rule, he thought gentlemen did not work gas companies for the good of the community, and he did not think the Cupar gas contractors had done so. If they had supplied gas it had been done for their own profit. He thought the sort of gas which they were getting was not what it ought to be, considering the price they were paying for it. If the water was fairly into the town, he thought perhaps the next thing would be an offer to take over the undertaking of the Cupar Gas Company.

What has now come to be known as the "Brechin Gas Job," reference to which was made in my "Notes" last week, is exciting a considerable amount of attention in the community especially interested in the case. A crowded meeting of the gas consumers of the town was held on the evening of Friday week, for the purpose of considering the resolution of the gas company to declare the capital double its actual amount, and to consider by what means they could protect themselves against the monopoly prices being exacted for gas, and the probably increased prices of the future. Several resolutions were passed at the meeting, one of which was—"That the interests of gas consumers are more safely invested in the Commissioners of Police than left in the hands of a private trading company, and that this meeting, accordingly, resolves to appeal to the commissioners to establish the necessary works for the manufacture and supply of gas to the community, and pledges itself to support the commissioners in adopting this course." A special meeting of the Police Commissioners was held last Wednesday night, for the purpose of receiving a deputation from the public meeting, by whom the principal resolutions were enlarged upon. When the deputation had had their "say," Bailie Lamb moved the following resolution:—"That the recent action of the gas company has shown that the supply of gas to the town of Brechin is not at present on a satisfactory footing, and it is, therefore, desirable that the Police Commissioners

should see that the interests of the community are protected. That, for this purpose, the following committee be appointed to inquire into the rights of the commission in the matter of the supply of gas to the town, and further, if they shall see fit, to look out for a site, consult with an engineer, and obtain estimates for the supply of the necessary works, and report to a future meeting, namely, Bailie Lamb and Bailie Smart, and Messrs. Duke, Ireland, D. Scott, jun., and Sharp." The motion was agreed to.

The latest result that I have of the testings of the Dumfries gas states that the illuminating power was 23·17 standard candles, the price being 6s. per 1000 cubic feet. Ammonia was present in very appreciable quantity, and of sulphuretted hydrogen there was a mere trace.

For the week ending the 20th of May, the illuminating power of the Glasgow gas (from three works) was very steady, the minimum ranging from 27·13 candles to 27·34 candles, and the maximum ranging from 28·22 candles to 28·76 candles. The gas from the Dalmarnock station was tested for ammonia and sulphur, the quantities being, respectively, ·33 and 12·50 grains per 100 cubic feet of gas.

An important water-supply scheme has just been inaugurated for the benefit of Busby, an important manufacturing village a few miles to the south of Glasgow. The pipes have been laid, and water was turned on with some ceremony last Tuesday, but the work connected with the reservoir, filter, gauge-well, &c., will not be completed for several months. The collecting-ground is about 2½ miles from the area of supply, and at a height of about 300 feet.

Extensive drainage operations are at present being carried on at Seafield, Leith. A large sewer, 4 feet by 2 feet 8 inches, is being constructed under the roadway westwards from Seafield Toll, at a depth of 24 feet. This work is intended for the drainage of the Links district, and finds an outlet at the east side of the toll, from whence it is carried out to sea in piled pipes, a distance of 240 feet. These pipes will be placed outside the breakwater of the new dock. The cost of the scheme is estimated at £4000, and the contractors are expected to have the whole work completed by the 20th of July.

The firmness in the Glasgow pig iron market, indicated in last report, was not continued during the past week, the price being as low as 57s. 9d. on two or three days, although sellers have asked 58s. On Friday afternoon business was done at 58s., three months open; closing buyers, 57s. 10½d.; sellers, 58s. cash.

Nothing new falls to be reported in regard to the coal trade. Prices are still very low, and some kinds of coal are in very limited demand.

CAMBRIDGE UNIVERSITY AND TOWN WATER COMPANY.—An extraordinary meeting of the proprietors was held on the 10th inst., for the purpose of creating 4375 £2 shares. The Rev. Dr. Okes took the chair, and, in proposing that new shares should be created, explained that further capital was required for the purpose of extending the company's works by the erection of an additional engine, boiler, and the laying down of main and service pipes, which, from reports recently made by their engineer (Mr. Tomlison), the directors had found to be necessary in order to meet the growing requirements of the town. The motion was seconded by Alderman Death, and carried unanimously. The meeting terminated with a vote of thanks to the chairman. At a public auction, on the 11th inst., Mr. Wentworth offered for sale 234 shares of £2 each in this company, representing in the aggregate £468. The price realized was £1093, which is at the rate of £233 for each £100.

STAFFORDSHIRE POTTERIES WATER COMPANY.—The annual meeting was held on the 24th inst.—Mr. J. Allcock in the chair. The directors report stated that the revenue shows an increased rental for the year ending March 25, 1876, exceeding that of the previous year by the sum of £957 17s. 4. The balance for the year ending March 25, and the previous undivided balance of £2285 8s., make a total of £3040 4s. 5d., out of which your directors recommend that a dividend at the rate of 6 per cent. per annum (clear of income-tax) upon the paid-up capital be declared, and payable by dividend warrants, to be forwarded to the shareholders on the 26th day of June next. This will absorb the sum of £5334, leaving (after placing a further sum of £1000 to the reserve-fund account, which will then amount, with interest, to £2522 19s. 11d.) a surplus of £2706 4s. 5d. Of this balance a sum of £2000 is required to meet compensation to millowners, leaving a net balance of £706 4s. 5d. to be carried to next year's account. During the past year the operations at the Cheddleton Park Works have been suspended, and your directors consider it advisable to still further suspend these works till the completion of the extensions at present being carried on at the Meir, where a large additional supply is expected to be obtained from the sinkings in connexion with the existing 24-inch bore-hole, the supply from which has not abated in the least since its completion. A portion of the temporary plant at the Cheddleton Park Works will be used for carrying on the works at the Meir. The service of water to the district is being equalized and rendered much more uniform by improved distribution. Most of the higher portions of the district now get their supply during the day, instead of at night as formerly. These changes have been brought about, in a great measure, by the constant supervision exercised by the inspectors in the prevention of waste, and also in the improved character and quality of the fittings. The boilers at Wall Grange and Meir pumping-stations have undergone repairs. These, together with the other works of the company, are in good working order. The report was adopted, and the dividend recommended therein declared. After the re-election of directors and auditors, a resolution was carried to increase the remuneration of the directors from £200 to £400 per annum, and of the auditors from ten to twenty guineas. The meeting was then made special, for the purpose of consideriug a proposal to convert or consolidate the shares of the company into a general capital stock, and it was resolved accordingly.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

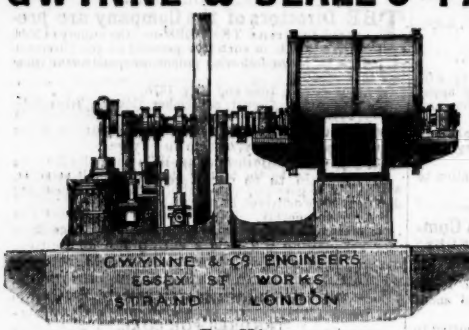


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

GWYNNE & CO.
HAVE MADE THE
LARGEST AND MOST PERFECT
EXHAUSTING MACHINERY
Ever produced, and the most economical in working.

Prices and every information on application.

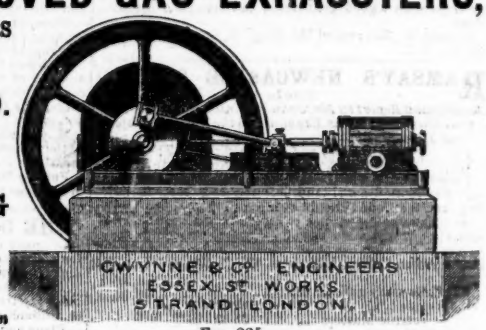
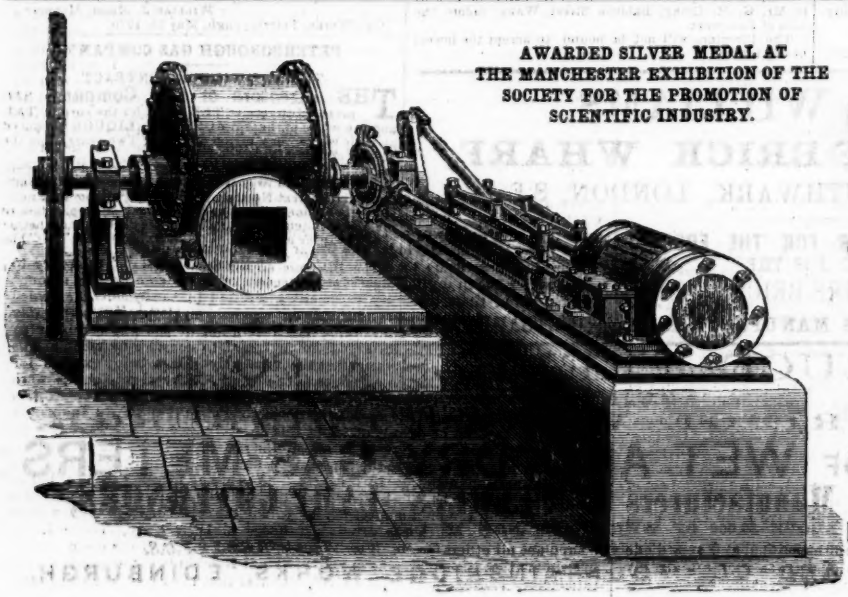


FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the most perfect system of action yet discovered. Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 52,500 cubic feet per hour. GWYNNE AND CO. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the excellence of the article produced, and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for Engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,
CAN BE HAD ON APPLICATION TO
GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.
G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.



AWARDED SILVER MEDAL AT THE MANCHESTER EXHIBITION OF THE SOCIETY FOR THE PROMOTION OF SCIENTIFIC INDUSTRY.

BEALE'S
Improved Patent
GAS-EXHAUSTERS
WITH
ENGINES COMBINED.

Sole Makers,
GEORGE WALLER & CO.

Makers of
ENGINES, EXHAUSTERS,
INDEX and DISC GAS-VALVES,
HYDRAULIC MAIN VALVES,
BYE-PASS VALVES,
TAR, LIQUOR, and other PUMPS,
SCRUBBERS and PURIFIERS,
CONDENSERS, BOILERS, &c.

PHŒNIX ENGINEERING WORKS,
HOLLAND STREET, S.E.,
AND
STROUD, GLOUCESTERSHIRE.

WANTED, a situation as Working MANAGER in a small country Gas-Work. Thoroughly understands the manufacture and distribution of gas, retort-setting, &c. Twenty years experience. Eleven years in present situation.
Address T. CRESWELL, Gas-Works, Cuckfield, SUSSEX.

WANTED, by the Advertiser, a situation as GAS-FITTER, Main and Service Layer, Meter Inspector, or to take charge of small works. Good references. Would have no objection to go abroad.
Address, G. K., 24, George's Place East, Russell Street, BERMONDSEY, S.E.

WANTED, by a thoroughly practical Man, who will shortly be disengaged, a re-engagement as MANAGER of a Gas or Gas and Water Works. Is well experienced in every department. Can produce first-class testimonials and references.
Address No. 265, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

ODHAM GAS AND COKE COMPANY.

WANTED, a Working Manager for the above works. One who thoroughly understands the working of retorts, laying down services, and taking the account of meters. Will be required to enter on the 20th of July next.
Written applications, stating age and other particulars, also amount of wages, and testimonials, to be sent to Mr. HORNSBY, Secretary to the Company, Odiham, HANTS, on or before Tuesday, the 6th of June, 1876.
N.B.—House on the premises, gas, and coal found.

GAS-FITTER, for interior work, wanted, for the Gas-Works, Barbadoes. Expenses out and home. Wages 45s. per week.
Apply to the SECRETARY, Barbadoes Gas Company, 11, QUEEN VICTORIA STREET, between Ten and One daily.

GAS ENGINEER Wanted, for four or five weeks from June 11, to inspect a small colonial Gas-Work. Expenses out and home paid, and two guineas per day during absence.
Applications, by letter, to CHAIRMAN, 25, Ebury Street, PIMLICO, S.W.

TRAVELLER.

A First-class Man required to represent an old established house in the Gas-Meter line. None but men of good address and gentlemanly appearance are eligible. A pushing, steady, energetic man, combining the above with a good connexion, can command his own terms.
Address No. 267, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

RAMSAY'S NEWCASTLE CANNEL COAL.
Analysis and Report by Mr. John Pattinson, F.C.S., Analytical Chemist and Gas Examiner to the Newcastle-upon-Tyne Town Council.

Laboratory and Assay Office, 75, The Side, Newcastle-on-Tyne, April 21, 1876.

I hereby certify that I have examined a sample of Ramsay's Newcastle Cannel Coal, received from G. H. Ramsay, Esq., and that I find the following results:—

On subjecting the sample to distillation in a coal-testing apparatus, 12,000 cubic feet of gas were obtained per ton, having an illuminating power equal to 28·0 standard sperm candles when burnt through a No. 7 Bray's Union Jet Burner.

The Coke assay gave as follows:—

Coke	66·70 per cent.
Volatile Matters	33·30 ,,
Total	100·00 per cent.

The Coke is of good quality.

A complete ultimate analysis was made of the sample, and the following results obtained:—

Carbon	78·62 per cent.
Hydrogen	5·39 ,,
Oxygen	4·81 ,,
Nitrogen	0·88 ,,
Sulphur	0·71 ,,
Ash	9·06 ,,
Water	0·53 ,,
Total	100·00 per cent.

All the above results show that this is a very valuable coal for gas-making purposes. The yield of gas is large, and the illuminating power high. There is less than the average amount of sulphur, and the coke is of good quality.

JOHN PATTINSON, F.C.S.,
Analytical Chemist and Gas Examiner to the Newcastle-upon-Tyne Town Council.

ADVANTAGES OF GAS FOR

COOKING AND HEATING.

HINTS ON GAS BURNERS, &c.

By MAGNUS OHREN, A.I.C.E., F.C.S.

Specimen Copy by post Threepence, direct from MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

ON SALE—One Round Station-Meter, to pass 12,000 feet per hour, with 8-in hydraulic valves and bye-pass. Will be thoroughly overhauled and fitted with new drum.
Apply to J. AND J. BRADDOCK, Globe Meter-Works, OLDHAM.

FOR SALE—A Gasholder, 50 ft. by 18 ft., with four columns, &c., complete.
Two Condensers, with top and bottom boxes, and 36 pipes, 4-in. to each.
Set of four Purifiers, 3 ft. square, with centre-valve, lift, and 6-in. connexions.
Station-Meter, with 6-in. connexions.
All the above are in perfect working order.
Forty tons of cast-iron Mains, 3, 4, and 5 in.
Apply to W. TICE, Gas Engineer, Worsley, near MANCHESTER.

LAMP-COLUMNS.

THE Directors of the Bournemouth Gas and Water Company have for DISPOSAL 76 Cast-Iron LAMP-COLUMNS. Weight about 4 cwt. 1 qr. each.
Tenders for the same to be sent to the Secretary, on or before the 15th of June next.
The Columns may be seen on application to the Company's Manager, Mr. GEORGE GOOCH, BOURNEMOUTH, or a tracing will be sent on application to him or to the Secretary, WILLIAM CASH, Esq., 26, NICHOLAS LANE, E.C.

THE Swansea Gaslight Company have for immediate SALE, the following Plant:—
A 6-h.p. Patent Trunk Engine. (Beale.)
Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Beale.)
Exhauster to pass 15,000 feet per hour. (Beale.)
An 8-h.p. Grasshopper Engine. (Easton and Amos.)
Cylindrical Egg-ended Boiler, 20 ft. by 4 ft. 6 in. (Easton and Amos.)
Exhauster, 20,000 ft. per hour. (Beale.)
Tar, Liquor, and Water Pumps, Eccentrics, Shafting, and Driving Pulleys.
Wrought-iron Condenser, six vertical Legs, 30 ft. high, 24 in. by 6 in., with tar-boxes, dips, and syphons.
Wrought-iron Scrubber, 5 ft. diameter, 20 ft. high.
Cast-iron Scrubber, 3 ft. diameter, 20 ft. high.
A set of four cast-iron Purifiers, 12 ft. square by 5 ft. deep, with galvanized wrought-iron covers, lifting apparatus, four tiers of wooden sieves, 10-in. connexions and valves.
May be seen at the Gas-Works, Swansea. The whole in perfect working order; replaced by plant of larger dimensions.
Further particulars may be obtained on application to Mr. THORNTON ANDREWS, SWANSEA.

THE Director of the Catalana Gas Company of Barcelona is prepared to receive TENDERS for a Telescope GASHOLDER, Wrought-Iron Columns, and Girders, all free on board in any port.
The Gasholder being of a capacity from 8000 to 10,000 cubic mètres, and working under a pressure of about 80 millimètres.
Plans and specifications, with terms, to be submitted to the said Director, Mr. José Gil, at 13, Calle Ancha, Barcelona, Spain, on or before the 10th of June next.
The Director does not bind himself to accept the lowest or any tender, and reserves to himself the right of accepting the whole or any portion of one tender.

WARE GASLIGHT AND COAL AND COKE COMPANY, LIMITED.

THE Directors of this Company invite TENDERS for the supply of 900 tons of New Pelton or Pelaw Main Gas Coal, to be delivered on the works at Ware at such times and in such quantities as may be directed by the Company during the year ending the 29th of September, 1876.
Sealed tenders, endorsed "Tender for Coal," to be sent to Mr. G. H. GISBY, Baldock Street, WARE, before the 12th of June next.
The Directors will not be bound to accept the lowest or any tender.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Oldham Corporation Gas-Works Committee are prepared to receive TENDERS for a supply of about 47,000 tons of CANNEL and COAL.
Particulars may be obtained on application to Mr. Herbert Andrew, Gas Offices, Oldham.
Tenders to be sent in on or before Tuesday, June 6, 1876.
By order,
H. BOOTH, Town-Clerk.
Oldham, May 25, 1876.

CONTRACT FOR COAL, &c.

THE Directors of the Preston Gas Company are prepared to receive TENDERS for the supply of CANNEL, COAL, and Cannel Slack or Nuts, for the next One, Three, or Five years.
Tenders, endorsed "Tender for Coal, &c." and addressed to the Chairman of the Committee, must be delivered on or before Saturday, the 10th of June next.
Further particulars may be obtained from HENRY GREEN, Engineer.
Gas-Works, Preston, May 19, 1876.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

CONTRACT FOR COAL.

THE Directors of this Company are prepared to receive TENDERS for about 16,000 tons of GAS COAL.
Particulars and conditions of tender to be obtained on application to the SECRETARY at the Works.
Tenders to be sent in by the 5th of June prox.
North Street, Wandsworth, May 23, 1876.

BLACKPOOL BOROUGH GAS-WORKS.

TO CONTRACTORS.

THE Gas Committee of the Corporation are prepared to receive TENDERS for the construction of a GASHOLDER-TANK, 103 ft. diameter, 20 ft. deep.
Plans and specifications may be seen at the Office of the undersigned.
Tenders, properly endorsed, to be sent in, addressed to the Chairman of the Gas Committee, before the 5th day of June next.
The Committee do not bind themselves to accept the lowest or any tender.
By order,
JOHN CREW, Engineer and Manager.

MANSFIELD GASLIGHT COMPANY.

TENDERS FOR COALS.

THE Directors of the Company are prepared to receive TENDERS for the supply of 3500 tons of GAS COAL, or such less quantity as the Directors may think fit, in the following proportions, and at the times specified, viz.:—
150 tons each in June and July, 1876.
400 tons each in August, September, October, November, December, 1876, and January, 1877.
300 tons in February, 1877.
200 tons in March, 1877.
150 tons each in April and May, 1877.
The Coals to be the best of their kind, well screened, and as free as possible from sulphur, bats, bind, refuse, and dirt, and to be delivered at Mansfield Station.
Payments monthly.
Tenders to be sent in on or before Saturday, June 10.
By order,
W. BRYAN, Clerk to the Company.
Mansfield, May 27, 1876.

PETERBOROUGH GAS COMPANY.

TENDERS FOR COAL.

THE Directors of this Company are prepared to receive TENDERS for the supply of about 4000 tons of the Best Screened GAS COAL, delivered free at the Great Northern Coal Department, Peterborough, in such quantities monthly as may be required between the 1st day of July, 1876, and the 30th day of June, 1877; or, at the option of the Directors, for 3000 tons, to be delivered as aforesaid between the first mentioned date and the 31st day of March, 1878.
Tenders, giving particulars of the Coal, and stating the name and locality of the pit, and the seam from which the Coal is to be taken, must be delivered to me on or before the 17th day of June next.
The Directors do not bind themselves to accept the lowest or any tender. Payments monthly.
By order,
WILLIAM J. MOON, Manager.
Gas-Works, Peterborough, May 25, 1876.

PETERBOROUGH GAS COMPANY.

TAR AND LIQUOR CONTRACT.

THE Directors of this Company are prepared to receive TENDERS for the surplus TAR and the whole of the AMMONIACAL LIQUOR produced at their works, for a period of One or Two years, from the 1st day of July next.
The Gas Company will deliver the Tar and Liquor respectively into railway tank trucks, at the Goods Department of the Great Northern Railway at Peterborough.
Further information may be obtained on application to me, to whom tenders, stating the price per ton, and whether the offer is for one or two years, must be sent not later than the 17th day of June next.
The Directors do not bind themselves to accept the highest or any tender.
By order,
WILLIAM J. MOON, Manager.
Gas-Works, Peterborough, May 25, 1876.

ALFRED WILLIAMS,
PHŒNIX FIRE-BRICK WHARF,
64, BANKSIDE, SOUTHWARK, LONDON, S.E.

GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

D. BRUCE PEEBLES & CO.,
ENGINEERS,
FOUNTAINBRIDGE WORKS, EDINBURGH,
MANUFACTURERS OF **WET AND DRY GAS-METERS;**
Patentees and Sole Manufacturers of PEEBLES' LAMP-GOVERNORS,
ABOVE 30,000 OF WHICH ARE NOW IN USE.
"These Lamp-Governors are so superior that they are likely to supplant all others."—*Dr. Wm. Wallace, F.R.S.E., F.C.S.*
D. BRUCE PEEBLES AND CO., FOUNTAINBRIDGE WORKS, EDINBURGH.

HAMPTON COURT GAS COMPANY.

TENDERS FOR COAL.

THE Directors of this Company invite TENDERS for the supply of COALS to their works, for One, Two, or Three years. Annual quantity 3000 tons of Inland—viz., Dodworth, Old Silkstone, Limehurst, Strafford, Audley, or Shariston Screened Nuts.

Also 2000 tons of Newcastle Coal per annum for the same period—viz., New Pelton, Pelaw Main, Holmside, East Pontop, or North Pelton.

The Coals to be delivered to the Company's siding at Teddington, in a dry and good condition, to the satisfaction of Mr. E. Price, the Company's Engineer and Manager, from whom further particulars may be obtained.

Net weight to be guaranteed in the trucks on the Company's weigh-bridge.

Payments monthly.

Sealed tenders to be forwarded not later than the 6th of June, addressed to F. J. Kent, Esq., Chairman, Castle House, Hampton.

The Directors do not bind themselves to accept the lowest or any tender.

W. HAMMOND, Secretary.

May 25, 1876.

TENDERS FOR GAS COALS.

THE Directors of the Canterbury Gas and Water Company invite TENDERS for the supply of 5000 tons of best GAS COALS, to be delivered as follows:—

800	tons	during the month of	June next.
800	,,	,,	July next.
800	,,	,,	August next.
600	,,	,,	October next.
500	,,	,,	November next.
500	,,	,,	December next.
500	,,	,,	January next.
500	,,	,,	February next.

Persons tendering to state the name and guarantee the description of the Coal proposed to be supplied, and the price per ton, either free on board, or delivered at the Contractor's sole expense into the Company's coal store, the weight in the latter case to be ascertained on the Company's weigh-bridge, and paid for accordingly.

Tenders, endorsed "Tender for Gas Coal," to be addressed to me, and delivered at the Company's Offices, Castle Street, Canterbury, before Ten o'clock in the forenoon of Friday, the 2nd of June next.

The Directors do not bind themselves to accept the lowest or any tender.

By order,
JAMES BURCH, Secretary.

Canterbury, May 19, 1876.

ROCHDALE CORPORATION—GAS DEPARTMENT.

TENDERS FOR COAL AND CANNEL.

THE Gas Committee of the Corporation are prepared to receive TENDERS for the supply of COAL and CANNEL during a period of One, Two, or Three years, to be delivered free at the Milkstone siding, Rochdale, or at the Gas-Works, in the following quantities each year, and in such monthly proportion as the Engineer may direct, viz.:—

Year ending		
June 30, 1877	Coal	16,500 tons.
	Cannel	4,500 ,,
June 30, 1878	Coal	18,000 ,,
	Cannel	12,000 ,,
June 30, 1879	Coal	20,000 ,,
	Cannel	13,000 ,,

Tenders, endorsed "Tender for Coal," to be sent to me on or before the 20th of June, 1876.

Further particulars may be obtained from Mr. Paterson, Gas-Works, Rochdale.

By order,
ZACH. MELLOR, Town-Clerk.

Town-Hall, Rochdale, May 26, 1876.

CORPORATION OF NOTTINGHAM.—GAS DEPARTMENT.

TENDERS FOR COALS.

THE Gas Committee are desirous to receive OFFERS for supplies (amounting in the aggregate to 80,000 tons) of SOFT COALS and SOFT COBBLES or NUTS, for the period terminating on the 30th of April, 1877.

The Large Coals and the Cobbles or Nuts are to be separately delivered, where and as from time to time directed, by and at the expense of the Contractors, upon the Gas-Works Railway Siding, in the East Croft, at Nottingham, and at the Midland Company's Railway Station, at Nottingham, and also on the Gas-Works Railway Sidings, at Radford and Basford respectively; and at and after the rate of one-eighth part of such total quantity in each calendar month, commencing with the month of July next, till the Corporation shall be satisfied with the amount of accumulated stock, and afterwards at such rate as shall be from time to time directed, till the agreed quantity shall have been delivered.

The Corporation will undertake to receive from each person or firm whose tender may be accepted, a total quantity of 5000 tons at the least; but they do not bind themselves to accept the lowest or other tender or tenders, till after a satisfactory trial of the Coals and Cobbles or Nuts, to which such tender or tenders may relate, shall have been made. They are to be the best of their kind, well screened, and as free as possible from sulphur, bats, bind, refuse, and dirt, and shall be weighed (20 cwt. to the ton), upon the Corporation machines, or upon such other machines as may be mutually agreed upon.

Payments will be made monthly, if and so long as the contract shall be duly fulfilled, to the extent of nine-tenths of the amount of the verified invoices, and the balance will be discharged on the satisfactory completion of the contract.

Further information, and forms on which the tenders must be made, may be obtained on application to Mr. J. Wilson, at the Gas Offices; and the tenders (sealed) specifying the description of Coals and the pits at which they are to be raised, and stating the prices for deliveries at the several places and in manner and subject to the conditions aforesaid, must be delivered to Samuel George Johnson, Esq., Town-Clerk, on or before Tuesday, the 13th day of June next.

By order,
M. OGLE TARBOTTON, Borough Engineer.

Corporation Gas Offices, George Street, Nottingham, May 19, 1876.

BRITISH ASSOCIATION OF GAS MANAGERS.

ANNUAL MEETING OF MEMBERS

CIRCULAR OF ARRANGEMENTS.

THE

THIRTEENTH ANNUAL GENERAL MEETING

OF THE MEMBERS OF THIS ASSOCIATION WILL BE HELD ON

TUESDAY, WEDNESDAY, & THURSDAY, the 13th, 14th, & 15th of June, 1876,

AT THE

SOCIETY OF ARTS ROOMS, JOHN STREET, ADELPHI, LONDON.

ROBERT MORTON, ESQ., M. INST. C.E., PRESIDENT,

Will occupy the Chair.

ORDER OF PROCEEDINGS.

TUESDAY, JUNE 13, 1876.—Morning Meeting.

The Chair to be taken at Eleven o'clock.

Inaugural Address by the President. | Admission of New Members.
Reading of Papers and Communications.

Evening Meeting.

A Lecture will be delivered at the Society of Arts Rooms, by W. MATTIEU WILLIAMS, Esq., F.R.A.S., F.C.S., &c., &c., On "The Different Qualities of Iron and Steel, their Manufacture and Applications."

The Chair will be taken at Half-past Seven o'clock.

WEDNESDAY, JUNE 14, 1876.

The Chair to be taken at Eleven a.m.

Reading of Papers and Communications, and the Transaction of other Business.
Election of Officers for ensuing Year, &c.

At Six p.m. the Members and Friends will dine together at the Terminus Hotel, Cannon Street. Tickets for the Dinner, 7s. 6d. each, may be had from the Secretary, if taken on or before the 13th of June. After that date 10s. will be charged.

THURSDAY, JUNE 15, 1876.

An Excursion by Steamboat to Beckton, where, by the courtesy of the Chartered Gas Company, the Members will have the opportunity of inspecting the Gas-Works, which have, since their last visit, undergone enormous extensions, and are now by far the largest Gas-Works in the world. On finishing the inspection the Members will re-embark, when Luncheon will be served, and the Boat continue its course down the river as far as time will permit of its return to London by about Six o'clock p.m.

LIST OF PAPERS AND COMMUNICATIONS

TO BE SUBMITTED TO THE MEETING.

SUBJECT FOR DISCUSSION—"THE ESTABLISHMENT OF A BENEVOLENT FUND."

The Order in which the Papers are Read will be determined by the Committee prior to the Meeting, so as to suit the general convenience.

"Piece Work or Day Work, as applied to the Reduction of the Labouring Force in Gas-Works." By Mr. T. TRAVERS, of Cork.
"Is the Reduction of the Sulphur Compounds worth the Cost and Trouble it entails." By Mr. GEO. LIVESEY, of London.
"The Reduction of Sunday Labour." By Mr. CORBET WOODALL, of London.
"Heating Retorts." By Mr. WM. RICHARDS, of London.
"Further Experience with Concrete Tanks." By Mr. GEO. LIVESEY, of London.
"Mains and Services." By Mr. W. J. WARNER, of South Shields.
"The Best Means of Extending the Use of Gas." By Mr. JAS. WATSON, of London.
"Is the Removal of the Dip desirable?" By Mr. W. L. COPP, of Watchet.
"Valuation of Ammoniacal Liquor." By Mr. W. D. CHILD, of London.
"A New Exhauster." By Mr. F. W. FISON, of Ilkley.

May 27, 1876. WILLIAM H. BENNETT, *Secretary.*

Will shortly be Ready, price 10s. 6d.,

AN ANALYSIS OF THE METROPOLITAN GAS COMPANIES ACCOUNTS FOR 1875,

(In continuation of the previous Six Years, 1869—1874,)

COMPILED AND ARRANGED BY JOHN FIELD,

LATE CHIEF ACCOUNTANT TO THE IMPERIAL GAS COMPANY.

And (now Ready) by the same Author,

A COMPARATIVE AVERAGE ACCOUNT BOOK

FOR THE ENTRY OF GAS COMPANIES ACCOUNTS FOR SERIES OF YEARS.

Price, for Half Yearly and Yearly Comparison, Foolscap Size, for 20 Years, 21s.; Quarto, for 14 Years, 12s. 6d.; for Yearly Comparisons only, for 14 Years, 8s. 6d.

Can be had of WM. B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

AND OF

EDEN FISHER, STATIONER, 50, LOMBARD STREET, LONDON, E.C.

Thicker Books for several Companies Accounts by order to E. FISHER, who will, upon application, send Specimen Pages of the Books.

GEORGE ORME & CO.,

ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.

B. GIBBONS, JUN.,

DIBDALE FIRE-CLAY, BRICK, AND GAS-RETORT WORKS,

STOURBRIDGE (Established 1834),

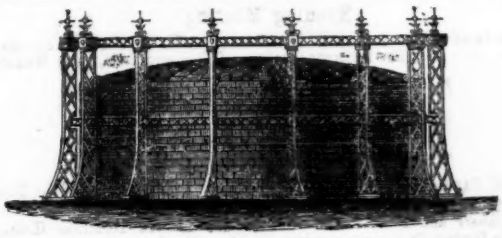
MANUFACTURER OF EVERY DESCRIPTION OF

Bars, Lumps, Stays, Shields & other Bricks, & Gas-Retorts,

A LARGE QUANTITY OF RETORTS ALWAYS IN STOCK.

Circular . 14 in., 15 in., 16 in., 18 in.
Ovals . . 17 in. × 14 in., 17 in. × 15 in., 20 in. × 15 in., 21 in. × 15 in., &c.
D's. . . { 14 in. × 14 in., 15 in. × 12 in., 15 in. × 13 in., 17 in. × 14 in., 18 in. × 13 in.
{ 18 in. × 15 in., 20 in. × 16 in., 22 in. × 14 in., 24 in. × 14 in., 24 in. × 15 in., &c.

Special attention given to the execution of Export Orders.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

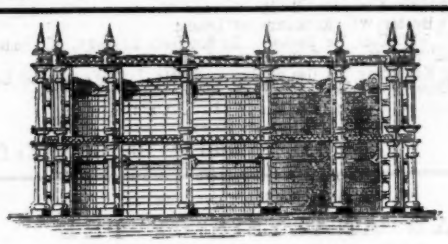
AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

HOPE IRON WORKS,



STOCKTON ON TEES.

ASHMORE & WHILE,

GAS ENGINEERS & CONTRACTORS,

MANUFACTURERS OF GASHOLDERS,

GAS APPARATUS OF EVERY DESCRIPTION,

Including Improved

Retort-Lids, Boilers, Cast and Wrought Iron Tanks, Iron Roofing, Bridges, Girders,

And GENERAL IRONWORK.

N.B.—Estimates for all Gas Plant and Remodelling supplied on application.

TO COALOWNERS.

THE Gas Committee of the Corporation of the Borough of Leeds are now ready to receive TENDERS for the supply of CANNEL and best GAS COALS.

Each party tendering to state the quantity he will engage to supply, and to quote price per ton delivered at the Gas-Works, York Street, Meadow Lane, or New Wortley, unless the Coals are intended to be conveyed *via* Midland, and in that case price per ton to be quoted, delivered on the Gas-Works sidings, from that railway, at Hunslet Lane and Geldard Junction.

The Cannel and Coals to be well dressed and screened, and free from hob, slack, and pyrites, and the size of mesh and inclination of screen over which the Coals have been passed must be stated.

Delivery to take place in such quantities as the Committee or their Engineer may from time to time direct, and the Committee reserve to themselves the right to determine the contract without notice, if at any time the delivery be inferior to the quality contracted for.

Period of contract, six, nine, or twelve months, as may be agreed upon.

Tenders to be sent in to my Office, Town-Hall, not later than Wednesday, the 14th day of June next, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Coals."

The lowest or any tender will not necessarily be accepted.

By order,
C. A. CURWOOD, Town-Clerk.

Leeds, May 22, 1876.

T. NEWBIGGING,

CONSULTING GAS ENGINEER,

5, NORFOLK STREET, MANCHESTER.

Mr. ALFRED LASS,

60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

D. M. NELSON,

48, GORDON STREET (late 135, BUCHANAN ST.),

GLASGOW,

Supplies every requisite in connexion with the distribution of Gas and Water.

Estimates and prices on application.

WOOD GRIDS for Purifiers and Scrubbers.

Cast-Iron PIPES and VALVES.

Street LAMP-PILLARS.

Patent Pipe SCREWING-MACHINES, &c.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street WESTMINSTER.

G. A. BAILEY AND CO., Machinists, Manufacturers of all kinds of Indexes for Gas and Liquid Meters, Tell-Tales for Turnstiles, on an improved principle. Every description of Wheel and Worm Cutting any size, &c.

86, Crampton Street, Newington Butts, LONDON, S.E.

N.B.—Country Orders executed with despatch.

BIRTLEY IRON WORKS,

CHESTER-LE-STREET,

DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBUTION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.

South Shields. W. J. WARNER.

PRICE'S PATENT COKE & COAL BARROW

effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

THOMAS LAMBERT & SONS

MANUFACTURE EVERY DESCRIPTION OF

GAS AND WATER FITTINGS;

ALSO,

WROUGHT-IRON TUBES & FITTINGS.

SHORT STREET, LAMBETH, LONDON.

THOMAS CARR & SON,
MANUFACTURERS OF
FIRE-BRICKS, LUMPS, TILES, RETORTS,
&c., &c.,
SCOTSWOOD FIRE-BRICK WORKS,
SCOTSWOOD-ON-TYNE.

PLUTONIC CEMENT,
For Repairing Gas-Retorts in Action, preventing Porosity, and reducing the Deposit of Carbon, is highly commended.
WILLIAM RICHARDSON,
GAS AND HYDRAULIC ENGINEER,
CHARLES HENRY STREET AND BISSELL STREET, BIRMINGHAM.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,
Keep in London and at their works large stocks of PIPES and CONNEXIONS (1½ to 36 inches in diameter); also make and supply Retorts, Tanks, Columns, Girders, Special Castings required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.
CHARLES HORSLEY, Agent.

BELGIAN CLAY RETORTS.
J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.
Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

FIRE-CLAY RETORTS.
WILLIAM FRASER,
INVERKEITHING,
Owner of the Works at which Fire-Clay Retorts were first made), can supply
RETORTS, FIRE-BRICKS, &c.,
to any extent.
References can be given to managers of above a hundred Gas-Works whom he supplies.
He ships at Charlestown his
CELEBRATED HALBEATH STEAM COALS,
on Navy List.

JAMES NEWTON & SONS,
(Established 1820,)
FIRE-BRICK AND TILE MERCHANTS,
Wholesale and for Exportation,
FALCON DOCK, 78 AND 79, BANKSIDE,
SOUTHWARK, LONDON, S.E.,
DEPOT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for
GAS AND WATER WORKS.

TO GAS COMPANIES.
GEORGE McKAIG,
MANUFACTURER OF
GAS-PURIFYING WOOD SIEVES,
153, CLEVELAND STREET,
DONCASTER.
It requires but one trial to prove the Superior Make, Strength, and Durability of these Sieves.
CARRIAGE PAID.

SZERELMEY
ANTI-CORROSIVE COMPOSITIONS.
SZERELMEY IRON PAINT having been in use for upwards of twenty years, has stood the test of time. SIR CHARLES BARRY reported to the Chief Commissioner of Works (in 1859) that the Iron Roofs of the Westminster Palace, coated in 1856, "Still afford the most convincing and satisfactory evidence of its efficacy," and anyone who looks at the work now, in 1876, will see the same evidence.
THE Undersigned have, by means of extensive machinery and improved processes, succeeded in reducing the price of the Szerelmey Iron Paint, that which was formerly sold at £35 they now supply at £33, and make other kinds, commencing at £20 per ton, including Black, Purple, Chocolate, Red, Green, Blue, Bronze Green, Grey, White, and various tints.
THE Szerelmey Liquid Enamel, sold ready for use, is the cheapest Anti-Corrosive Composition ever produced; it dries in four hours.
SZERELMEY Stone Paint thoroughly waterproofs brick and other walls without giving them the appearance of having been painted.
COPIES of the Reports of Sir Charles Barry, Sir R. J. Murchison, and Professor Faraday (printed by order of the House of Commons), with twenty years of favourable testimony.
Price lists, discounts, and all particulars may be had of
N. C. SZERELMEY & COMPANY
(LIMITED),
6, MARTIN'S LANE,
LONDON, E.C.

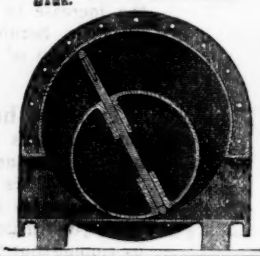
JOHN HALL AND CO., STOURBRIDGE,
Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.
N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

JAMES MILNE & SON,
GAS ENGINEERS,
Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,
EDINBURGH, AND
2, KING EDWARD STREET,
NEWGATE STREET, LONDON.
Meter Works in London—2, CROSS STREET, WILDERNESS ROW, E.C.

STATION-METERS, GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,
And every description of Gas-Fittings and Gas Apparatus.

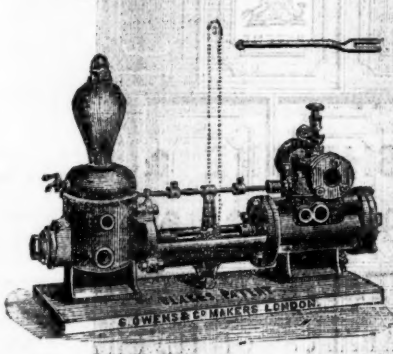
TRADE MARK
J. BEALE'S
PATENT
GAS EXHAUSTER.



BEALE'S CONTINUOUSLY ACTING
GAS EXHAUSTERS
ARE NOW MANUFACTURED BY
B. DONKIN & CO.
MR. J. BEALE, of East Greenwich, having retired from business, has made an arrangement with B. DONKIN & CO. for the sole manufacture of his Patent Solid-Slide Gas Exhausters.
B. D. & Co. also make Steam-Engines to drive Gas Exhausters direct or otherwise, and Gas-Valves.
Estimates and Prices on application to
B. DONKIN & CO.,
ENGINEERS & IRONFOUNDERS,
55a, BLUE ANCHOR ROAD, BERMONDSEY,
LONDON, S.E.

S. OWENS & CO.,
WHITEFRIARS STREET, LONDON, E.C.,
HYDRAULIC ENGINEERS,
AND MANUFACTURERS OF
PUMPING MACHINERY of every Description.
SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF
BLAKE'S PATENT STEAM-PUMPS,
More than 8000 in use,
ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.
The following are some of the prominent advantages of the BLAKE PUMP:—

It will start at any point of stroke.
It has no dead point.
It works fast or slow, with the same certainty of action.
It is economical. Has a lead on the slide-valve.
It is compact and durable.

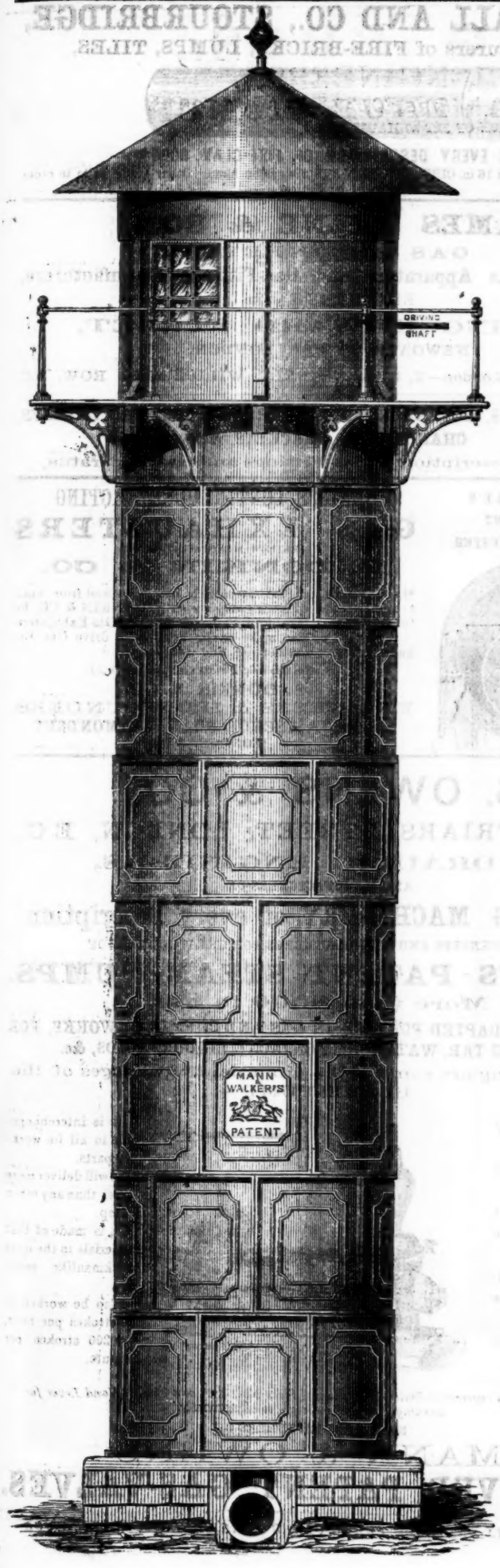


It is interchangeable in all its working parts.
It will deliver more water than any other pump.
It is made of best materials in the most workmanlike manner.
Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.
SOLE MANUFACTURERS OF
MANN & OWENS
IMPROVED PATENT GAS-VALVES.
PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

C. & W. WALKER,
8, Finsbury Circus,
London, E.C.

MANN & WALKERS' PATENT SCRUBBER.



By Letters Patent in Great Britain, Europe, and the United States of America.

By some important improvements recently patented, the purifying power of these Scrubbers has been much increased, and a stronger ammoniacal solution obtained, which is found to absorb a large portion of the carbonic acid contained in gas, effecting an important saving in money and labour in the lime purifiers, and where oxide only is used, the increase in the illuminating power of the gas obtained by these Scrubbers is shown in a remarkable degree, in consequence of the large quantity of carbonic acid removed from the gas.

It is to be particularly noted that the important results of these Scrubbers do not depend upon the machinery alone. The entire internal construction of the Scrubber bears an almost equally important part. For this reason, where it is desirable to convert existing Scrubbers, whose dimensions happen to be suitable, the work commences by ripping out the whole of the interior of the shell, and beginning the internal construction *de novo* from bottom to top.

They are, in all cases, constructed under guarantees to perfectly perform their work. They are now extensively used in the largest gas-works of London and the chief cities of Europe, the number in use exceeds **one hundred,** and their perfect efficiency and profit to a gas company have been fully established with every variety of coal used in Europe. References can be given to the largest gas-works in Europe.

By their use the department of purification from ammonia upon a gas-works is made complete, without the aid of prepared oxide of iron, chemicals in purifiers, or any other supplementary process, and the whole ammoniacal residual product contained in the coal is absorbed and obtained in the form most profitable to a gas company, while the requirements of all Acts of Parliament and of the Board of Trade, relating to incorporate gas companies, are satisfied.

Foul Gas, properly condensed, entering the inlet is, by once only passing through the Scrubber, completely purified from ammonia with regular certainty day by day, without any further trouble, or any other process, effected by a very small quantity of clear water let into the machinery room at the top of the Scrubber, which is discharged at the liquor outlet at the bottom, from Newcastle coal at about 18 to 20 ounces strength, from Yorkshire and other coals, generally from 25 to 30 ounces strength; while acidulated litmus or turmeric exposed at the Scrubber outlet will not show the slightest discoloration, and there is not a quarter of a grain of ammonia per 100 feet left unabsorbed.

They contain their own engine power, requiring only a small inappreciable quantity of steam from the gas-works boiler, and are then complete in themselves, ready for service.

Applications relating to dimensions and prices should be addressed to us, C. and W. Walker, 8, Finsbury Circus, London, E.C., or to Mr. William Mann, late Superintendent of the Chartered Gas-Works, Blackfriars, London; they should state approximately the largest make of gas in 24 hours on a winter's day, and the smallest make on a summer's day, to be purified.

KÖRTING BROS.,

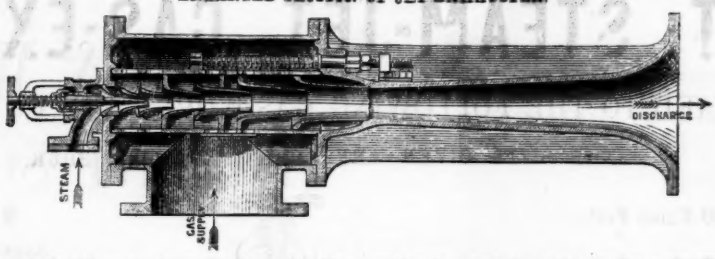
STEAM-JET ENGINEERS,

7 & 17, LANCASTER AVENUE, MANCHESTER.

Supplied to—

*Chartered Gas Co.
*London Gas Co.
South Metropolitan Gas Co.
Phœnix Gas Co.
*Liverpool Gas Co.
Bolton Corporation.
*Horsham Gas Co.
*Epsom and Ewell Gas Co.
Ipswich Gas Co.
Carrick-on-Suir Gas-Works.
*Wakefield Gas Co.
*Guildford Gas Co.
*Gloucester Gas Co.
Birmingham Corporation.

ENLARGED SECTION OF JET EXHAUSTER.

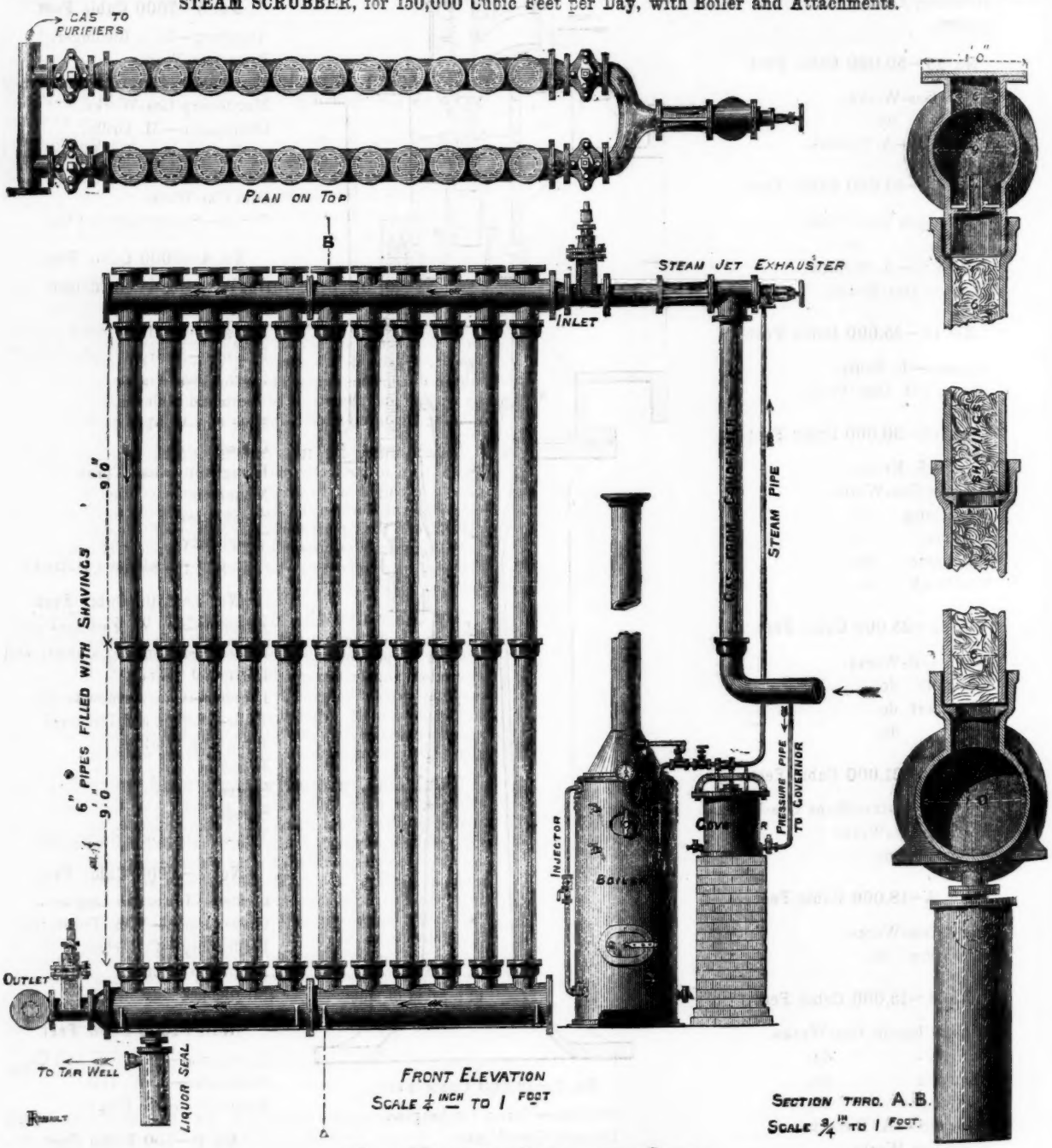


Supplied to—

Cheltenham Gas Co.
*Sandwich Gas Co.
Cornholme Dis. Gas-Works.
Bury Gas-Works.
Glasgow Corporation.
*Leyland Gas Co.
Stalybridge Gas-Works.
*Lincoln Gas-Works.
*Nantwich Gas Co.
Kirkintilloch Gas-Works.
Burnley Gas-Works.
Enniskillen Gas-Works.

* Those marked with a star have the Steam Scrubber working in connection with the Steam-Jet Exhauster.

General arrangement of KÖRTING-CLELAND'S PATENT STEAM-JET GAS EXHAUSTER, with CLELAND'S PATENT STEAM SCRUBBER, for 150,000 Cubic Feet per Day, with Boiler and Attachments.



For Particulars, apply to

KÖRTING BROS., 7 and 17, LANCASTER AVENUE, MANCHESTER;

OR TO

GERALD J. TUPP, 8, JOHN ST., ADELPHI, LONDON, W.C., Sole Agent for England and Wales;

OR TO

DEMPSTER, MOORE, & CO., 49, ROBERTSON STREET, GLASGOW, Sole Agents for Scotland.

E. KÖRTING'S
PATENT STEAM-JET GAS-EXHAUSTER

IS SUPPLIED TO THE FOLLOWING GAS-WORKS AND CONTRACTORS:—

(THE SIZES GIVEN ARE CUBIC FEET PER HOUR.)

No. 16.—For 60,000 Cubic Feet.

Berlin Gas-Works.
Brussels—P. Bailly.
Hamburg Gas-Works (five of this size).

No. 15.—50,000 Cubic Feet.

Berlin Gas-Works.
Breslau do.
Halle a/S.—A. Riebeck.

No. 14.—40,000 Cubic Feet.

Copenhagen Gas-Works.
Dresden do.
Halle a/S.—A. Riebeck.
Hanover Gas-Works.

No. 13.—35,000 Cubic Feet.

Brussels—P. Bailly.
Witten a/R. Gas-Works.

No. 12.—30,000 Cubic Feet.

Essen—F. Krupp.
Hanover Gas-Works.
Magdeburg do.
Mayence do.
Melbourne do.
Osnabrück do.

No. 11.—25,000 Cubic Feet.

Berlin Gas-Works.
Chemnitz do.
Düsseldorf do.
Fürth do.

No. 10.—21,000 Cubic Feet.

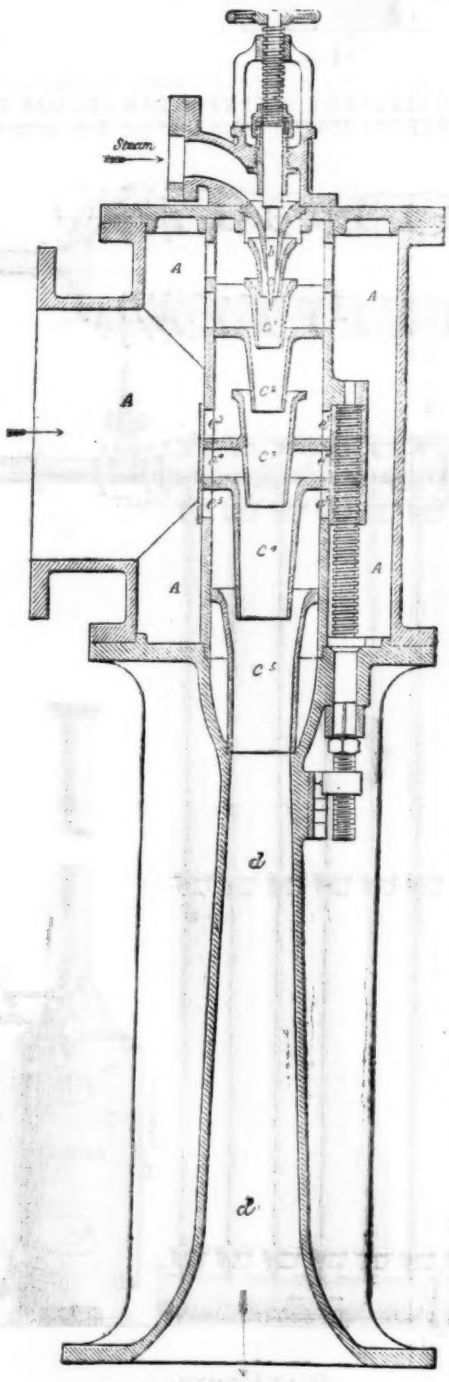
Frankfort-on-the-Maine Gas-Works.
Rostock Gas-Works.
Zürich do.

No. 9.—18,000 Cubic Feet.

Cassel Gas-Works.
Wiesbaden do.

No. 8.—15,000 Cubic Feet.

Aix-la-Chapelle Gas-Works.
Bochum do.
Chemnitz do.
Duisburg do.
Halle a/S.—A. Riebeck,
Posen Gas-Works.
Würzburg do.



No. 7.—12,000 Cubic Feet.

Bochum—Verein für Bergbau.
Brussels Gas-Works.
Glauchau do.
Hanover do.

No. 6.—9000 Cubic Feet.

Augsburg—L. A. Riedinger (2).
Heilbron Gas-Works.

No. 5.—7000 Cubic Feet.

Augsburg—L. A Riedinger.
Brieg Gas-Works.
Christiania—Heyerdahl and Co.
Magdeburg Gas-Works.
Oberhausen—M. Grillo.
St. Petersburg—Th. Jochim and Co.
Steele Gas-Works.
Ulm Gas-Works.
Zürich—Stirnemann and Co.

No. 4.—5000 Cubic Feet.

Augsburg—L. A. Riedinger.
Basle Gas-Works.
Brussels—A. H. Brandon and Co.
Brussels—J. Brunt, Lammers & Co. (2)
Dessau Gas-Works.
Dortmund "Union."
Eger Gas-Works.
Gleiwitz do.
Königshütte Gas-Works.
Mannheim do.
Schaffhausen do.
Wandsbeck do.
Zyrardow—Hielle and Dittrich.

No. 3.—3500 Cubic Feet.

Augsburg—L. A. Riedinger (3).
Brussels—J. Brunt, Lammers and Co.
Dortmund "Union."
Dresden—Geb. Barnewitz (2).
Halle—Schatz and Daunneel.
Pirna Gas-Works.
Ronsdorf do.
Siegen do.
Stendal do.
Winterthür—Geb. Sulzer (2).

No. 2.—2000 Cubic Feet.

Garden—Jonas and Lingner.
Grevenbroich—Wm. Trimborn.
Lindenburg—C. Liebau.
Lorch Gas-Works.
Magdeburg do.

No. 1.—1000 Cubic Feet.

Christiania—Heyerdahl and Co.
Melbourne—J. W. Fell.
Reichenbach—E. Ringk.

No. 0.—500 Cubic Feet.

Berlin—Julius Pintsch.

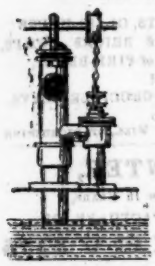
For GREAT BRITAIN and IRELAND, see opposite page.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

13th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.
J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

COPP'S PATENT ANTI-DIP GAS APPARATUS.



Produces from 10 to 20 per cent. more gas of higher illuminating power.
Prevents the deposit of carbon.
Retorts last much longer.
Charges work off quicker.
This simple invention has been in use in many works for the last six months, with the above results.

PRICE 2 GUINEAS EACH

Testimonials and particulars on application.

Address WALTER L. COPP, WATCHET, SOMERSET.

LAMP-PILLARS,
GAS-LAMPS, FOUNTAINS.

Our New and Choice Designs for the above, with prices, are forwarded to any part of the world on receipt of twelve stamps. Estimates for work at home or abroad.

W. T. ALLEN & CO.,
GAS & WATER ENGINEERS & CONTRACTORS,
203, UPPER THAMES STREET,
LONDON, E.C.

TAR PUMPS,
GAS LIQUOR PUMPS,
LIFT PUMPS,
FORCE PUMPS,
Portable or Fixed for Hand or Power.
SYPHON PUMPS.

Price, as engraving, with
T-handle . . . . . 17s. 0d.
With bow-handle . . . . 16s. 0d.

F. W. TURNER,
MANUFACTURER,
ST. ALBANS IRON-WORKS.

IMPROVED
GAS-VALVES,
AT GREATLY
REDUCED
PRICES.

Inch.	£.	d.
3	25	0
4	36	0
5	40	0
6	54	0
7	63	0
8	80	0
9	85	0
10	100	0
12	120	0
14	140	0

TANGYE BROS. & HOLMAN,
LAURENCE POUNTNEY LANE,
LONDON.

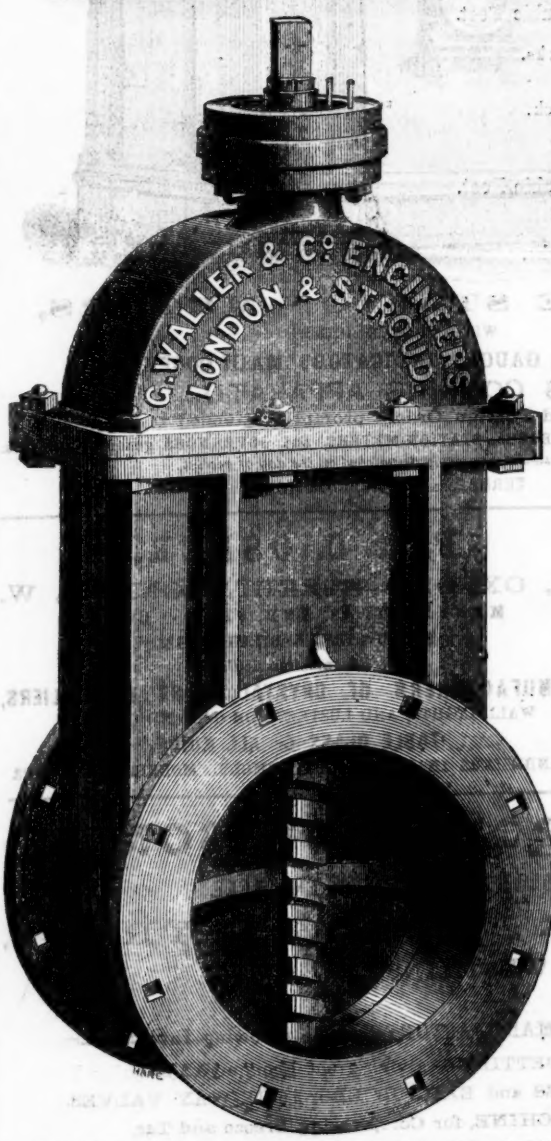
J. T. B. PORTER & CO.,
GAS ENGINEERS.
MANUFACTURERS AND CONTRACTORS,
GOWTS BRIDGE WORKS,
LINCOLN.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.
REFERENCES TO 500 WORKS ALREADY ERECTED.

N.B.—It is most particularly requested that all Communications be addressed to the FIRM ONLY, as circumstances have arisen which render this necessary.

GEORGE WALLER & CO.,
GAS ENGINEERS AND CONTRACTORS.

IMPROVED INDEX GAS-VALVE.



The Door of Valve has a Circular Wedged Back.

G. WALLER & CO.

Were the first manufacturers of Gas-Valves with Circular Wedged Backs.

The springs are to clear off any dirt from the face of door when closing. **The body is cast in one piece.**

These Valves are proved on both sides to 30 lbs. per square inch. The worm keeps the door open at any point, and clears out any dirt in the rack. One man can open the largest Valve without extra gearing. The Index on top has large studs to show how much the Valve is open, and they can be **readily felt in the dark.**

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, SOUTHWARK, S.E.,
AND AT
STROUD, GLOUCESTERSHIRE.

J. & J. BRADDOCK,

GAS ENGINEERS,

GLOBE METER-WORKS, OLDHAM,

MANUFACTURERS OF

WET & DRY CONSUMERS GAS-METERS,

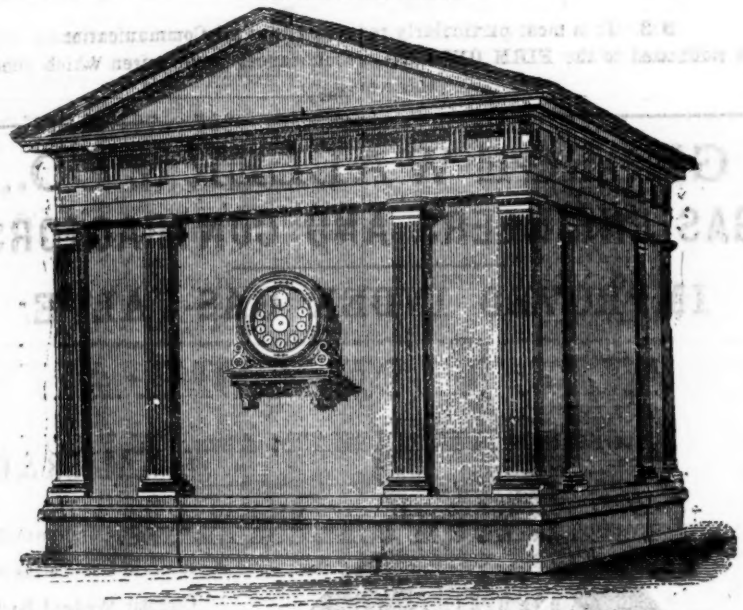
OF THE HIGHEST EXCELLENCE ONLY;

ALSO LICENSEES AND MANUFACTURERS OF

WARNER & COWAN'S PATENT SELF-REGULATING GAS-METERS;

ROUND STATION-METERS,

ON CAST-IRON STANDS.



SQUARE STATION-METERS,

WITH PLANED JOINTS.

GOVERNORS, GAUGES, INDICATORS, MAIN COCKS, &c.

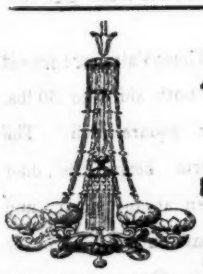
GAS COOKING APPARATUS.

Home and Foreign Orders promptly attended to.

All Sizes of CONSUMERS METERS, STATION-METERS, and GOVERNORS generally in Stock.

Orders almost invariably despatched on the day of receipt.

TERMS, &c., ON APPLICATION.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS,

WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.

GEORGE ANDERSON,

GAS AND CONSULTING ENGINEER,

35A, GREAT GEORGE STREET,

WESTMINSTER, S.W.

PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES.

FUEL-MACHINE, for Compressing Breeze and Tar.

WASHERS, SCRUBBERS, and PURIFIERS, that Economize Space and Cost.

N.B.—Pamphlet, with Eighteen Illustrations of the foregoing, with letterpress on the construction of Gas-Works, post free, 2s. 6d.

WATER-MAINS.

COTTERILL'S PATENT STEEL TUBE-DRILLS, for connecting services to water-mains *under pressure*, without turning off the water. They drill and tap themselves, and are left in the mains. Made of all sizes, from ¾ to 2 inches and upwards. They cost less than the ordinary plan.

Apply to CHARLES FORSTER COTTERILL, Cannock, STAFFORD, Patentee.

ADDISON POTTER,

WILLINGTON QUAY,

NEAR NEWCASTLE-UPON-TYNE,

Manufacturer of

CLAY RETORTS, FIRE-BRICKS, AND EVERY DESCRIPTION OF FIRE-CLAY GOODS

TROTTER, HAINES, & CORBETT,

BRETTELL'S ESTATE

FIRE CLAY & BRICK WORKS,

STOURBRIDGE.

Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.

Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.

Successors to

E. BAKER AND CO., LATE BRIERLEY HILL, STAFFORDSHIRE.

B. CARPENTER,

(ESTABLISHED MORE THAN 15 YEARS,)

THE ORIGINAL MANUFACTURER OF

WOOD SIEVES

FOR

GAS PURIFIERS & SCRUBBERS.

WORKS:

22, HERMES STREET, PENTONVILLE ROAD,

LONDON, N.

DEMPSTER'S

RENOWNED

WOOD SIEVES,

WITH TAPER BARS,

MADE BY MACHINERY

CAPABLE OF MAKING 10,000 FEET WEEKLY.

References to Hundreds of First-Class Engineers.

ROSE MOUNT IRON-WORKS

ELLAND, NEAR HALIFAX.

"SELLARS' CEMENT"

PREVENTS WASTE OF GAS FROM RETORTS;

SAVES CLAY RETORTS FROM DESTRUCTION BY FIRE;

GREATLY ECONOMIZES THE USE OF FIRE-BRICKS;

And PREVENTS ALL POSSIBLE LOSS of GAS FROM LEAKAGE.

J. C. SELLARS,

THE GAS CEMENT WORKS,

BIRKENHEAD.

GAS AND WATER PIPES.

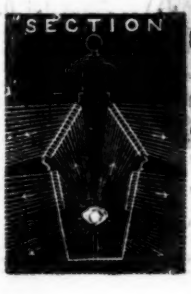
WILLIAM MACLEOD & CO.,

18 & 20, ALSTON STREET, GLASGOW.

CAST-IRON GAS AND WATER PIPES.

DELIVERY F.O.B. ON CLYDE, OR STOCKTON-ON-TEES.

Prices on application.



THE PATENT

CATOPTRIC LAMP

Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.

T. A. SKELTON, 37, Essex St., Strand, LONDON, INVENTOR AND PATENTED.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

173, ST. VINCENT STREET, GLASGOW.

SHOTT'S BOGHEAD.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 24-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full Analyses on application.

THE

FRAMWELLGATE COAL COMPANY,

DURHAM,

Are prepared to supply their

SCREENED AND NUT GAS COALS.

This Coal yields 11,000 cubic feet of gas and 13½ cwts. of coke per ton.

OFFICES: ROYAL EXCHANGE, MIDDLESBROUGH.

HEBBURN MAIN GAS COALS.

Cubic feet of Gas yielded per ton . . .	10,050
Illuminating power in sperm candles . .	15·4
Yield of coke per ton of good quality . .	13½ cwts.

THE TYNE COAL COMPANY, LIMITED, OWNERS.

W. RICHARDSON, Fitter,

29, QUAYSIDE, NEWCASTLE-ON-TYNE.

GAS COAL.

POPE & PEARSON, LIMITED,

have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

SCOTCH CANNEL COALS.

The Subscriber is prepared to contract for the supply of all the principal SCOTCH CANNEL COALS. Prices and Analyses of the various Coals will be forwarded on application.

JAMES M'KELVIE,

CANNEL COAL MERCHANT,

HAYMARKET, EDINBURGH.

Established 1840.

MOBBERLEY & PERRY,

FIRE CLAY and BRICK WORKS,

STOURBRIDGE.

Proprietors of

BEST GLASS-HOUSE POT and CRUCIBLE CLAY.

Manufacturers for Home and Export.

GAS-RETORTS, GLASS-HOUSE FURNACE,

BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,

And Every Description of Best Fire-Bricks.

CANNEL COAL.

COPPA COLLIERY, MOLD,

Beg leave to call the attention of Gas Companies to the superior quality of their

CANNEL FOR GAS-MAKING PURPOSES.

This Cannel produces in actual working, in iron retorts, 9200 cubic feet of 32-candle gas, and upwards of 11 cwt. of coke, and in clay retorts will produce 11,500 cubic feet of 25·9-candle gas.

Ports of shipment—Birkenhead or Connah's Quay.

Waggons supplied for delivery by railway to any part of England or Wales.

For particulars, prices, and rates of freight, apply to The Coppa Colliery, Mold, FLINTSHIRE.

INTERNATIONAL EXHIBITION, 1862.

CLASS X.

PRIZE MEDAL

For excellence of Fire-Clay Gas Retorts, and "HONOURABLE MENTION" for good quality of Fire-Bricks.

WILLIAM STEPHENSON & SONS,

THROCKLEY,

NEWCASTLE-ON-TYNE.

C. & W. WALKER'S

WOOD PURIFIER SIEVES,

Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,

DONNINGTON, NEAR NEWPORT, SHROPSHIRE.

8, FINSBURY CIRCUS, LONDON.

THE WIGAN COAL & IRON COMPANY,

LIMITED,

DISTRICT OFFICE: 18, BENNETT'S HILL, NEW STREET, BIRMINGHAM; AGENT: W. M'GOWAN;

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

N.B.—The Wigan Coal and Iron Company, Limited, are exclusive owners of the well-known HAIGH HALL AND KIRKLESS HALL GAS COAL COLLIERIES.

SILKSTONE AND MIDLAND

GAS COAL & CANNEL.

EMOR G. WRIGLEY

Has on hand a quantity ready for immediate delivery, and is prepared to contract for Supplies during the years 1876 and 1877.

Can strongly recommend his real OLD SILKSTONE GAS COAL, which will give, in regular work, 10,200 feet 16·6-candle gas, and 12 cwt. superior coke.

PRICES AND ANALYSIS WILL BE FORWARDED TO ANY PART ON APPLICATION TO THE CHIEF OFFICE,

120a, STAMFORD STREET, ASHTON-UNDER-LYNE.

MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS AND COLLIERIES,

NEAR SHEFFIELD,

STRONGLY RECOMMEND A TRIAL OF THEIR

CELEBRATED SILKSTONE GAS NUTS.

Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—

(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.

Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.

These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.

APPLICATIONS FOR PRICES, &c., TO BE SENT DIRECT TO THE COLLIERY, AS ABOVE.

THE SILKSTONE & DODWORTH COAL & IRON COMPANY, LIMITED,

DODWORTH, BARNSLEY.

BENJAMIN WHITWORTH, Esq., M.P. . . . . Chairman.
Mr. RICHARD HARTLEY . . . . . Managing Director.

REAL OLD SILKSTONE GAS COAL.

JAMES PATERSON, Esq., Gas Engineer, of the Warrington Gas Company, reported, Aug. 10, 1875:—

"This Coal possesses remarkable qualities as a gas and coking coal, and appears SECOND TO NONE IN THE KINGDOM. It contains the large quantity of 699 lbs. of illuminating matter, and 1498 lbs. of coke to the ton, and produces **12,240** cubic feet of 16·66 candle gas."

The above Company are raising nearly a thousand tons of the Real Old Silkstone Gas Coal per working day.

PRICES QUOTED TO ANY RAILWAY STATION, OR F.O.B. HULL, GRIMSBY, GOOLE, KEADBY, LIVERPOOL, AND FLEETWOOD.

ALBERT GAS COAL.

THE DERBYSHIRE SILKSTONE COAL COMPANY, LIMITED,

CAN OFFER A

GAS COAL

Of superior quality, delivered at any station in England and Wales.

Purified gas per ton of coal in cubic feet (average)	**10,775**
Weight of coke in lbs. per ton of coal	**1,465**

ANALYSIS AND PRICES ON APPLICATION TO

Mr. EDMUND TAYLOR, Secretary,

ALBERT COLLIERY, NEWBOLD, NEAR CHESTERFIELD.

THE LOCHORE AND CAPLEDRAE CANNEL COAL COMPANY, LIMITED.

Works: LOCHORE by LOCHGELLY, FIFESHIRE. Office: CUSTOM HOUSE CHAMBERS, LEITH.

This Company request attention to the very superior quality of their Cannel Coals.

1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.	Sample worked at Lochore.
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure . .	13,095 cubic feet.	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	34·83
Value of 1 cubic foot of gas in grains of sperm	780	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	71 minutes.
Gravity of the gas (air = 1000)	596	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.	Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	33·09
Value of 1 cubic foot of gas in grains of sperm	878	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	67 minutes.
Gravity of the gas (air = 1000)	677	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company.

OFFICE: CUSTOM HOUSE CHAMBERS, LEITH.

CROLL'S
DRY GAS-METERS,

PRIZE MEDALS.
LONDON, 1851;
NEW YORK, 1853;
PARIS, 1855.

(INVENTED & PATENTED IN 1844,)

COMBINING ALL THE LATEST IMPROVEMENTS,

MANUFACTURED ONLY BY

PRIZE MEDALS.
LONDON, 1862;
DUBLIN, 1865;
PARIS, 1867

THE GAS-METER COMPANY, LIMITED,

238, KINGSLAND ROAD, LONDON, N.E.

ALEXANDER WRIGHT & CO.,

MANUFACTURERS OF

"WET" & "DRY" GAS-METERS

Of the highest excellence.

STATION-METERS AND GOVERNORS.

STREET-LAMP REGULATORS.

TESTING APPARATUS

Of the most perfect description for all purposes relating to Gas.

"GAS MEASUREMENT AND GAS-METER TESTING," by F. W. HARTLEY, A. Inst. C.E.
Third Edition, cloth boards, 2s.; per post, 2s. 2d.

55 and 55A, MILLBANK STREET, WESTMINSTER, S.W.

R. LAIDLAW AND SON,

EDINBURGH AND **GLASGOW.**

Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

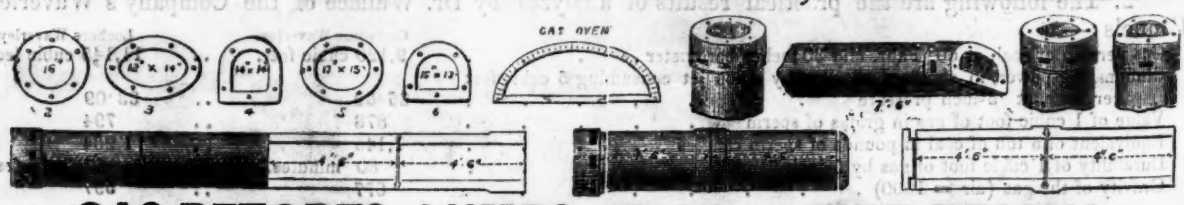
STATION-METERS, ALL SIZES, up to 15 feet Square, with PLANED JOINTS;

Experimental Meters, Photometers; Pressure-Gauges,
Governors, Test Holders, &c., &c.

LONDON OFFICE: 106, CANNON STREET, E.C.

HARRIS & PEARSON,

FIRE-CLAY AND BRICK WORKS, STOURBRIDGE.



GAS-RETORTS, LUMPS, TILES, & FIRE-BRICKS,

OF EVERY DESCRIPTION.

A LARGE ASSORTMENT OF GAS-RETORTS IN STOCK.

STOCK FOR EXPORT READY AT THE WORKS, AND AT ELLESMERE PORT.

London: Printed by WILLIAM BOUGHTON KING (at the office of Clayton and Co., 17, Bouverie Street, Fleet Street); and published by him at No. 11, Bolt Court, Fleet Street, in the City of London.—Tuesday, May 30, 1876.